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Indian Journal of Natural Sciences (IJONS)
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Volume XVII (17) CODEN: IJONS (96) (2026)		ISSUE 96	JUNE 2026 ISSN: 0976 - 0997
S. No	CONTENTS	Page No.	
209	Growth and Survival of <i>Clarias batrachus</i> with Associated Macroinvertebrate Dynamics in Integrated Rice – Fish Fields and Conventional Ponds in Lakhimpur, Assam, India Bipul Saikia	115247-115255	
210	The Silent Threat: From Cavities to Crisis : A Case Series of Patients Monika Tanwar, Manu Gupta, Sanjeev Kumar and Supayan Pal	115256-115262	
211	Deepfake-Assisted Collusion Attacks on Privacy-Preserving Social Network Publishing Urvashi Mandwale	115263-115267	
212	Role of <i>Virechana</i> and <i>Takradhara</i> in the Management of <i>Kushta</i> : A Case Series Suma K. J and Sangeeta Toshikhane	115268-115276	
213	Deep CNN Model for Multi-Stage Alzheimer's Classification Using Brain MRI Disha Maheshbhai Patel and Mitul Kumar Raj	115277-115282	
214	Accurate Prediction and Deceit Identification: A Machine Learning And Deep Learning Perspective Twisha Patel	115283-115290	
215	An Explainable Lightweight Fake-News Detection for Indian Code-Mixed Languages Deepali Shah and Neha Shah	115291-115295	
216	Diversity and Distribution Pattern Analysis of Cyanobacteria Isolated from the Freshwater Habitats of Jhargram, West Bengal, India Basudev Murmu, Tuhin Mallick and Harisankar Dey	115296-115307	
217	A Novel Federated Hybrid Learning Framework for Privacy-Preserving and Accurate Heart Attack Prediction Deepak Kumar Singh, Akash Sanghi, Kamal Upreti and Gaurav Agarwal	115308-115318	
218	A Novel Framework of Q - Complex Fermatean Neutrosophic Sets with Algebraic and Operational Properties Vijaya V, Rajalakshmi G and Rajalaxmi D	115319-115328	
219	Antimicrobial Resistance : A Catastrophic Threat Shalini Kapoor, Amit Bhardwaj and Himani	115329-115340	
220	A New Perspective Way on Approaching Chatterjea Mapping in Multiplicative Modular Metric Space Augustine Antony L ¹ and A. Mary Pariya Dharsini	115341-115348	
221	Boruta-Optimized Quasi - Recurrent Stacked Autoencoder (B-QRSAE) for Low - Latency Intrusion Detection in Cloud Computing M.Varshitha and E.Saikiran	115349-115363	
222	Solving Pythagorean Fuzzy Transportation Problem using Average Cost Penalty Method S. Sharmila Banu and A. Prasanna	115364-115373	

223	Rank-Integrated Composite Ratio Estimation of Central Tendency in Probability Sampling Geetanjali Rathod	115374-115379
224	Hybrid Low-Voltage High-Performance SET-MOS Architecture for Analog Systems Ashok D. Vidhate, Chella Santhosh and Shruti Suman	115380-115389
225	Dynamic Programming and Statistical Modeling Approaches for Climate Prediction and Renewable Energy Optimization Tushar Mandanaka, Mansi Nadiyadra and Srikant Singh	115390-115394
226	Fedzt-Ids: A Blockchain-Integrated Federated Learning Framework For Quantum-Resistant Zero-Trust Intrusion Detection In g Networks Bhavisha Shah and Asmita Patel	115395-115402
227	The Fragrance of Autonomy: A Feminist Critique of Marital Subservience in Sudha Murty's Gently Falls the Bakula K.S. Mymoona Parveen and Md.Sahidul Islam	115403-115405
228	A Literature Review on Siddha Formulation <i>Bavana Kadukkai</i> Mathirai Elansekaran Selladurai, Shanmuga Priya R, Vennila Kesavan, Sudha Revathy Senthil Kumar, Anbarasan Balasubramanian, Rajamanjari Kalaiaimuthan, Logamanian M and Senthilvel G	115406-115417
229	<i>Justicia santapaui</i> Benn. and Rau: A Comprehensive Review Of The Taxonomy, Phytochemistry, And Conservation Status Of A Narrowly Endemic Medicinal Plant From The Western Ghats Biodiversity Hotspot Dhanya S R and P M Radhamany	115418-115427
230	Analysis and Solution of First-Kind Fuzzy Volterra Integral Models Using the San Transform M.Sangeetha and S. Akila	115428-115436
231	Indian Association of Physics Teachers and Development of Alternative School Physics Laboratories Bhopal Singh Rawat, Sam Nesamony and M.Harikrishanan	115437-115444
232	Gastro Retentive Drug Delivery System : Formulation Strategies and Clinical Relevance Gautam Verma, Pravin Kumar Sharma, Mohit Patil, Ashish Gupta, Sumeet Dwivedi and G.N. Darwhekar	115445-115456
233	Exploring Bioethics and Genetic Manipulation in Margaret Atwood's <i>Oryx and Crake</i> M. Usha Bharathi, S. Vembu, P. D. Mary Portia and M. Maheswari	115457-115464
234	Complex Intuitionistic Fuzzy Madm Model For Diagnosing Cancer Causes In Non-Smokers A. Shahirunnisa and S. Akila	115465-115476
235	Formulation and Evaluation of Polyherbal Tablets with Antimicrobial Activity Snigdha Chatterjee, Koushik Kuila, Ranadwip Kar, Anupam Bhunia and Piyali Khamkat	115477-115486
236	Importance of Rasa of Ahara According to Various Seasons : An Answer to Dietary Disorders Sarita Yadav, Sangeeta Gupta and Alka	115487-115492
237	gb - Chromatic Number of Some Standard Product Graphs Shila. D and Arokialancy. A	115493-115498
238	Exploring Near Difference Cordial Labeling In Cycle-Related Graph S. Jackson, M. Abirami and G.K. Mathan Kumar	115499-115503

239	Geometric Mean and Root Mean Square Based Fuzzy Delay Fourth Order Runge - Kutta Methods for Solving Fuzzy Delay Differential Equations S.Devigayathri and R.Gethsi Sharmila	115504-115514
240	A Controversial Analysis of <i>Bauhinia Variegata</i> L.[<i>Kanchanar</i>]: A Solution Vaishnavi Acharya, Suwarna Meshram, and Kruti Patel	115515-115521
241	Design and Development of Biodegradable Tiles for Sustainable Architecture : An Eco-Friendly Building Material Approach Rene A. Nala and Lope U. Codilla, Jr	115522-115528
242	A Study on Theoretical and Experimental Assessment of RC Beams using Both Geopolymer Concrete, Self-Healing Concrete Incorporating Microbial and Mineral Admixtures for Extended Service Life Shubham Kesarwani, Swati Keserwani and Mohd.Aquib	115529-115540
243	A Molecular Docking - Based Bio-Screening Assay for the Evaluation of ACE Inhibitory Potential of Phytocomponents from Polyherbal Formulation Vaasathi Kashayam – A Comparative Study with Captopril K.Preyadarsheni and A. Manoharan	115541-115554
244	Application for the Unveiling Patient Subgroups through Intuitionistic Fuzzy C-Means Clustering of Physiological Features U. Abuthahir and Tamilselvi K	115555-115563
245	Screening and Isolation of Antifungal Compounds from <i>Thespesia populnea</i> and <i>Nerium leander</i> G.Revathi	115564-115568
246	Assessment of Acute and Repeated Dose Oral Toxicity of Chitramanakku Ilai Chooranam (<i>Ricinus communis</i> Leaf Powder) Following OECD Guidelines S Senthamil Veni, Divya Jayachandran, E. Sathya priya and T Susmitha	115569-115576
247	Ayurvedic Management of Sidhma Kustha (Psoriasis) : A Case Report Upasana S. Pawar, Yogita Mandle and Dnyaneshwar M. Gadade	115577-115582
248	From Colic to Comfort : Wonders of <i>Berberis vulgaris</i> Q in Renal Calculi : A Clinical Case Rep Khyati Lakhani, A.N. Mathur and Ankur Desai	115583-115588
249	Polypharmacological Evaluation of <i>Justicia adhatoda</i> Alkaloids as Dual Inhibitors of Enoyl-ACP Reductase (InhA) and DNA Gyrase B (GyrB) for Tuberculosis Therapy : An <i>In-Silico</i> Study Ritesh Pandit, Sachin Kumar Sharma, Zalak Shah and Anshul J Harnawa	115589-115598
250	Enumeration of Split 2 – Dominating Sets and Split 2 – Domination Polynomials of Path P_n R. Japhia and S. Freeda	115599-115602
251	Enhancement of Self-Efficacy Through Experiential Drama : A Mixed Methods Study Among Young Adults Arunkumar V, Beena G, Vinay R, Gayathry V and Archana Bhat Kallahalla	115603-115615
252	Techniques for using MATLAB to Estimate the Weibull Distribution's Parameters for Customer Transaction Data Mouriya D and Mohamed Harif B	115616-115623
253	Determination of Related Compounds by RP - HPLC Method for the Estimation of Metformin and Alogliptin in Bulk and its Dosage Form Radhakrishnaveni Vadlamudi	115624-115629
254	Fenugreek (<i>Trigonella foenum graecum</i>) in the Management of Polycystic Ovarian Syndrome: Nutritional, Biochemical and Therapeutic Perspectives Shelly Garg, Hardik Dalal and Sakshi Garg	115630-115636

255	Nanotechnology in Periodontics: Current Advances, Clinical Applications and Future Perspectives Amit Mani, Shivani Sachdeva, Gayatri Magar, Sakshi Takale and Prabhavati Dive	115637-115650
256	Adoption Level of Grapevine Cultivation Practices Among the Farmers of Dindigul District of Tamil Nadu K. Thamim Ansary and R. Jeya	115651-115654
257	Ancient Wisdom for Future Trends: The Art of Natural Dyeing Techniques among the Karbi Community of Northeast India Ronjit Hanse and Ramie H. Begum	115655-115666
258	Nutritional Profiling and Consumer Acceptability of A Plant - Based Milk Alternative Samiya Mohammedi, Sundaravalli A and Padmashree Kulkarni	115667-115674
259	Review on Engineering Porous Biopolymeric Gels for Regenerative Medicine: Structural Design Strategies for Mechanical Stability and Biological Performance Karanam Mithun, Pratiksha Akki, M Mahesh Yadav, AHM Vishwanatha Swamy, Fatima Sanjeri Dasankoppa, Kusum S Akki, Shreya A Prabhu and Kamaladevi T Kshatriya	115675-115687
260	The Bengal Florican (<i>Houbaropsis bengalensis</i>) : Its Conservation and Habitat Crisis in Southeast Asian Countries Krishna Ghosh and Atreyee Saha	115688-115696
261	Formulation and Evaluation of Antimicrobial Herbal Soap Containing Chlorophytum Borivilianum (Safed Musli) Extract Hitesh A. Patil, Om C. Patil , Rupesh R. Chaure , Kishor S. Rathi, Vaishali D. Shewale	115697-115708
262	Antimicrobial, Antioxidant and Anti-Inflammatory Activities of the Siddha Polyherbal Formulation Megarajanga Kirutham S.P Kopperundevi, S.Santhanakittu and M.N Parandhaman	115709-115719
263	The Use of Digital Marketing Strategies Impact on Consumer Purchase Intent and Brand Loyalty A. Balamurugan, Ramya Thiyagarajan and Anupa Mistry	115720-115727
264	Influence of Ladder and SAQ Training on Selected Motor Fitness Parameters Among Basketball Players D. Boopathi	115728-115732
265	Isolation of A Novel Antitubercular Dihydrofuranone from <i>Clausena brevistyla</i> Fruits Ganapathy Sankari Subramanian, Jeyachandran Malaichamy and Ponsadai Lakshmi Subramanian	115733-115744
266	Effectiveness of Tissue Glue and Silk Sutures After Periodontal Flap Surgery : A Split - Mouth Clinical Study Shweta Vikhe, Shivani Sachdeva, Amit Mani and Sakshi Takale	115745-115752
267	Paradigm Shift in Periodontology: Integrating Holistic Modalities and the Oral-Systemic Axis in the Management of Periodontal Disease Raju Anarthe, Prabhavati Dive and Amit Mani	115753-115757
268	Site Secure Vision : An AI - Based Industrial Safety and Security Compliance Monitoring System Kamana Laina Amoomo ¹ , Udesang K. Jaliya ² , Hinaxiben M. Patel and Sanjay Dabhi	115758-115765

269	High Resolution-Liquid Chromatography Mass Spectrometry (HR-LCMS) - Based Phytochemical Profiling of <i>Pogonatum neesii</i> (Mull.Hal.) Dozy Sarath Ramesan V. V. and Pradeesh S	115766-115784
270	Thymidine Oxidation by the Sodium Chromate – Hydrogen Peroxide System: Kinetic and Mechanistic Insights, and the Modulating Roles of Ascorbic Acid and Riboflavin M.Sudha Swaraga	115785-115792
271	Lane - Wise Modelling of Time Headway Distribution Under Mixed Traffic Conditions on Urban Divided Highways Amit A Amin and L.B.Zala	115793-115807
272	Evaluation of Antipyretic Activity of <i>Annabedhi uppu</i> using Brewer's Yeast - Induced Pyrexia in Albino Rats Selvam V.D, Rujitha D and Visweswaran S	115808-115815
273	Environmental Toxicology of Microplastic Particles on Aquatic Animals Chandrama Basu, Rafath Rida and Shifa Mehreen	115816-115826
274	An Experimental Study on the use of Waste Glass Powder in Bitumen for Flexible Pavements Mohd Saud, Arvind Kumar, Rizwan Khan, Zeenat Bee and Awdhesh Kumar	115827-115838
275	Effectiveness of Median Nerve Mobilization on Hand Grip Strength, Pinch Strength and Median Nerve Conduction Velocity among College Students with Smartphone Overuse : A Two Group Pre-Test Post-Test Randomised Controlled Trial Study Protocol Shahrukh Ansari and Kanika	115839-115847
276	Gullying Induced Land Degradation as an Indicator of Ecological Stress and Shift in Livelihood Opportunities of Santals in South Western Birbhum District, India Sucheta Mukherjee, Druheen Chakraborty and Abhisek Saha	115848-115858
277	Video Instance Segmentation: A Comprehensive Survey Jigar A Dalvadi, Niteen Vaghela and Rushikesh Chaudhar	115859-115864
278	Constructing Sequences of Dio-3 Tuples from 30- Gonal Figurate Numbers of Eclectic Genres of Ranks S. Shanmuga Priya and G. Janaki	115865-115870
279	Decoding Sex from the Sternum: A DECT- Based Morphometric Study in Western Uttar Pradesh Region Pushpendra Kumar Rajput, Shmruti, Ankit Kumar, Vratika Arya, and Naresh Kumar	115871-115876
280	Ethnopharmacology of <i>Valeriana Jatamansi</i> - Update Review A. Aadhil and S. Sivakrishnan	115877-115883
281	Wavelet Energy-Based Adaptive Fault Detection and Severity Assessment for LVDC Microgrids Ashish Shah and Kalpesh Chudasama	115884-115892
282	Pharmaceutical and Clinical Aspects of <i>Guggulu Kalpana</i> : A Review Kavya G and Jagadeesh.Gmitti	115893-115898
283	Effectiveness of Russian Current in Enhancing Strengthening for Quadriceps Muscle Isokinetic Contraction in Physiotherapeutic Rehabilitation : A Systematic Review and Meta –Analysis Suraj Pradhan and Sunita Sharma	115899-115909

284	Study on the Breeding Performance and Developmental Stages of <i>Anabas testudineus</i> (Bloch, 1972) Induced with Synthetic Hormone Harshita Kashyap, Parag Deka and Bandita Talukdar	115910-115915
285	Strong α - Level Bijective Single Valued Neutrosophic Graphs and its Application in Agricultural Farming D Rajalaxmi, P. Saraswathi Devi and V. Vijaya	115916-115926
286	A Design of Two Stage Chain Sampling Plan ChSP-(0,2) using Fuzzy Parameter P.Kavipriya and A R Sudamani Ramaswamy	115927-115937
287	Autoimmune Hypothyroidism Treated with Individualised Homoeopathic Medicines: A Case Series Vijaykrishna V, Munjal Thakar and Zankhana Desai	115938-115959
288	Neutrosophic Subalgebras of Several types in UP – Algebras T. Radha and P. Gomathi Sundari	115960-115967
289	Performance Analysis of an Evacuated Tube Solar Water Heater with Thermosyphon Heat Pipe Integrated with Compound Parabolic Concentrator Using Different Working Fluids Jignesh Patel and Vijay Dhiman	115968-115982
289	Effects of Dynamic-Static Stretching Versus Static Stretching with Myofascial Release for Hamstring Flexibility in Adolescent Cricketers : A Randomised Controlled Trial Khushi Patel, Dhara Chavda and Payal Mehta	115983-115992
290	Homoeopathic Management of Recurrent Follicular Tonsillitis Complicated with Psychological Trauma - A Clinical Case Study Riya Jodha and Deepti Sharma	115993-115998
291	A Multilingual, Clause-Aligned Corpus of the Constitution of India Shruti Mishra and Ravirajsinh Chauhan	115999-116005
292	Poetry as a Tool for Vocabulary Development in children with learning Disabilities G.Hemanatchatra	116006-116008
293	Fractured Psyche: Trauma and Self-Repair in Leila Aboulela's Minaret A.Ammanullah, N.Sheik Hameed and N. Vadivu	116009-116017
294	English Language Learning Challenges of Tamil Medium Students: A Systemic Functional Linguistics Perspective B. Kanchana Mala and J.Muthulekha	116018-116022
295	The Representation of Indian social Realities, Cultural Realities and Emotional Realities in Shashi Deshpande's Works: A Critical Analysis M. Saraswathy and S. Patchainayagi	116023-116026
296	Designing an AI-Enabled Academic Vocabulary Assessment for Engineering ESP Students in HEIs: Pedagogical Implications D.AnilKumar,B Hima Bindu and Praneel Kumar Peruru	116027-116041
297	Indian History through Indian English Non-Fiction in Writings of William Dalrymple B. Pavan Kumar and S. Karthik Kumar	116042-116047
298	Emoji and Interpersonal Meaning: Extending Halliday's Framework to Digital Communication C. Shahin Banu and G.Vetriselvi	116048-116051

299	Imagining Planetary Futures: Ecocritical Analysis of Climate Crisis and Propositive Narratives in Kim Stanley Robinson's <i>The Ministry for the Future</i> S M Aswathy and S. Karthik Kumar	116052-116059
300	Mirrored Burdens: Emotional Parentification, Neglect and Traumatic Selfhood in <i>The Silent Patient</i> M. Devimanju and N.Suguna	116060-116072
301	Innovative Approaches in English Language Teaching for bridging the Skill Gap between Academic Education and Workplace Requirements G. Saratha Lakshmi and L. Gomathi	116073-116076
302	Embodied Ecologies: Somatic and Environmental Resistance in the Fiction of Meena Kandasamy and Avni Doshi A.Gandhimathi and J.Sangeetha	116077-116084
303	Rape Discourse and Expert Opinion: Attitudes Toward Survivors and Offenders in Contemporary Society G.Hemanatchatra	116085-116089
304	Conscience as confinement: An Existential-Psychological Reconfiguration of Punishment in Dostoevsky's novel <i>Crime and Punishment</i> G. Saratha Lakshmi and L Gomathi	116090-116094
305	August Wilson's <i>Gem Of The Ocean</i> As An Allegory K. Arul and N Sathiyarajan	116095-116098
306	Erratic Climate Change in India: Affective Climatology, Gendered Displacement, and the Literary Lens of <i>Memories of Rain</i> P. Aparna and S.I Muththamizh Selvi	116099-116109
307	Masculinity in Crisis: Infertility and Identity in Perumal Murugan's novel <i>One Part Woman</i> K. Vinothini	116110-116113
308	Exploring the Feminist Legacy in Shashi Deshpande's <i>Moving On</i> O. Kumara Swami	116114-116122
309	Psychoanalysis and Narrative Form: Unconscious Structures in Modernist Fiction Ankush Mishra	116123-116126
310	A Trinocular Systemic Functional Analysis of Ideational Meaning in Tamil Clauses M. Renuga and V. Vijayalakshmi	116127-116131
311	Study on Reading Literary Texts in Technical Language Classroom Pappy Vincent and R. Sathees Kumar	116132-116135
312	From Divine to Demon: Erasure of Women's Power-Rethinking of the Madonna-Whore Dichotomy and the Monstrous-Feminine in Popular Narratives Amutha Charu Sheela and J Raghavi Priya	116136-116152
313	A Literary Perspective: Exile and Cognitive Dissonance in Divakaruni's <i>Sister of My Heart</i> N.Vadivu	116153-116159
314	Interpreting Young Adult Voice in Shyam Selvadurai's <i>Funny Boy</i> P. Veerasamy	116160-116169
315	Enhancing Reading Comprehension in EFL Contexts: A Synthesis of Strategy-Based Instruction and Metacognitive Awareness R. Sathees Kumar and R. Murugan	116170-116173

316	Plant Dreaming and Animal Calling: Indigenous Epistemologies as Psychological Healing Modalities in <i>Solar Storms</i> B. Syed Abuthahir and S. Sakthivel	116174-116181
317	Soft Skills and the Memory – Emotion Nexus – A Study of Soft Skills and Memory in Preeti Shenoy's Fictions Dhayaasre T S and Binod Mishra	116182-116187
318	Reimagining Reality through Digital Science: A Critical Reading of Liu Cixin's <i>Ball Lightning</i> Samsonraj C, V. Elakiya, A. Ajai and K. Saravanan	116188-116194
319	The Desert as a Sacred Landscape: Mysticism and the Hero's Spiritual Transformation in <i>The Alchemist</i> P. Lovely Vinoliya Paul and N. Sathiyarajan	116195-116205
320	Psychoanalytic Trauma and the Afterlives of Childhood Abuse: A Freudian Reading of Anna Quinn's <i>The Night Child</i> S. S. Jaffer Sha, T. Sugadev and M. Vinoth	116206-116223
321	Truth and Fabrication: Narrative Multiplicity in Philip Roth's <i>Deception</i> James Raaj and M. Renuga	116224-116231
322	Narratives of Introspective Peregrination and Emotional Transformation in Amulya A Malladi's <i>A House for Happy Mothers</i> R. Prema and M. Punitha Priya	116232-116236
323	Plague, Despair, and Self-Realization in Philip Roth's <i>Nemesis</i> James Raaj and M. Nagalakshmi	116237-116241
324	Online Narratives and Cultural Identity in Northeast India R. Lalnunpari	116242-116248
325	Mapping Margins in Fiction: Intersectionality and Power Structures in Zadie Smith's <i>On Beauty</i> M. H. Bhagathwar and Md. Sahidul Islam	116249-116259
326	Integrating Gamification and Project-based Learning: Designing Student - Created Tools for English Language Learning S. Sreejana and Jaidev M. V.	116260-116267
327	Effects of AI-Mediated Task-Based Language Teaching on ESL Learners' Speaking Accuracy and Fluency I. Prem Kumar	116268-116281
328	Spiritual Psyche in Cultural Exile – Healing Embodied Trauma Through Literary Metaphor in Chitra Banerjee Divakaruni's <i>The Mistress of Spices</i> B.Jarina Begam and Md. Sahidul Islam	116282-116288
329	The Psychology of Honor: Social Stigma, Shame, and Intergenerational Trauma in Imayam's <i>A Woman Burnt</i> and Perumal Murugan's <i>One Part Woman</i> S. Newton and T. Mangaiyarkarasi	116289-116298
330	In the State of Flow: Reading Bishwanath Ghosh's <i>Aimless in Banaras</i> through Flow Theory A. S. Hari Priyaa, N. Sheik Hameed and M. Saraswathy	116299-116304
331	From Neglect to Nurture in Preeti Shenoy's <i>A Hundred Little Flames</i> S. Anandha Vaishnavi	116305-116308
332	Interconnected Cultures and the Corruption of Modernity in Indigenous Life: An Ecocritical Approach to the Works of Easterine Kire and Witi Ihimaera Jeffilda Esther and Md. Sahidul Islam	116309-116318

333	Spectrum of Feminist Agency from Survival to Subversion in Anita Nair's <i>Ladies Coupé</i> and Kavery Nambisan's <i>The Hills of Angheri</i> . N. Sivamadhi and N. Sathiyarajan	116319-116326
334	Partition Wound: A Psychoanalytic Study of Khadija Mastur's <i>The Women's Courtyard</i> R. Manimozhi and B. Kanchana Mala	116327-116330
335	Comparing Human and AI-Generated Communication: Implications for Creativity, Authenticity, and Future Authorship M. V. Prasith and S. Sreejana	116331-116336
336	Reading Against Ourselves: Cognitive Dissonance, Moral Complicity, and Bio-Capitalism in Paolo Bacigalupi's <i>The Windup Girl</i> M. Mohamed Anwar	116337-116346
337	A Freudian Reading of Trisha Raje's Character Development in <i>Pride, Prejudice, and Other Flavors</i> R. Shagiftha Anjum and Md. Sahidul Islam	116347-116353
338	Gamification as Cognitive Scaffolding: A Psycholinguistic Study of Working Memory Load and Attentional Control in ELT Gifto David and Muhammedali Chalikandy Puthiyapurayil	116354-116360
339	Digital Diaspora and Cultural Memory: Identity Formation and Self-Representation in Diasporic Narratives A. Sophia and S. I. Muththamizh Selvi	116361-116373
340	Undergraduate Students' Perspectives on Artificial Intelligence in Task-Based Language Teaching Muhammedali Chalikandy Puthiyapurayil	116374-116379
341	Remnants from Earlier Generations: Intergenerational Trauma and the Psychology of Inheritance in Michael Ondaatje's <i>Running in the Family</i> K. Nisha, A. Sulochana and J. Beaulah Joseline	116380-116385
342	Resilience and Self-Realization in the Female Protagonists of Selected Novels by Sudha Murty R. Ranjith Kumar and N. Sathiyarajan	116386-116394
343	Collective Memory Strategies in Sudha Murthy's Stories and Their Role in Shaping Young Minds of Today K. Pahlavi Mustafa	116395-116399
344	Psychoanalytic Perspective AI-Supported Academic Writing Sasikalaa Rajendran and Annam. R	116400-116418
345	Mapping Ecological Medical Humanities: A Bridge-Term Scientometric Analysis (2000–2025) A. Stany, Vijayakumar Selvaraj and M. Renuga	116419-116426
346	Memory Fragmentation and Resilience an Ecofeminist Reading of Gokhale and Roy R. Shubhakarini and A. Sulochana and B. Parvathavardhini	116427-116436
347	A Psychoanalytic Reading of Children's Literature: An Exploration of the Inner World of Childhood in <i>The Secret Garden</i> C. B. Shubamantha and S. Vanitha	116437-116443
348	Black and White Resistance: Memory, Nation, and Womanhood in Marjane Satrapi's 'Persepolis' V. Yazhini	116444-116448
349	Humanity in the age of AI: Preserving culture, Identity, values in Technological World R. Gunasekaran, R. Ramya, and G. Sarathalakshmi	116449-116454

350	Cyclonic Agency: Storm Sovereignty, Ecological Renewal, and the Non-Human Turn in Carpentaria N. Sudhakar, S. Muththamizh Selvi and G. Saratha Lakshmi	116455-116462
351	Dislocated Belonging: Spatial Liminality and Psychological Alienation in the West African Narrative of <i>Swing Time</i> S. Shyma and A. Catherine Anna Pushpam	116463-116470
352	Ecofeminism and Environmental Ethics: A Natural Science Perspective on Ecology and Gender in Kavita Kane's <i>The Fisher Queen's Dynasty</i> Radhika, K. Nagamani, and M. Vinoth	116471-116476
353	The Drought Within: Eco-Pschoanalysis and Magical Realism in Tayo's Trauma in Leslie Marmon Silko's <i>Ceremony</i> S. Mohamed Azarudeen, N. Sheik Hameed and C. Shahin Banu	116477-116484
354	A Feminist Reinterpretation of Sita in Chitra Banerjee Divakaruni's <i>The Forest of Enchantments</i> Vijayavalli M and Suriyanarayanan A	116485-116493
355	Reversing Jairaj's Place from Margin to Center: Challenging the Performativity of Masculinity in Mahesh Dattani's <i>Dance Like a Man</i> Sangita Saha	116494-116500
356	The Ecology of the Sacred: Ecospiritual Dimensions in Margaret Atwood's Selected Works K. V. Sunrima and S. Karthik Kumar	116501-116507
357	Ecological Multiplicity and Postcolonial Futures: Tidal Narratives, Climate Imagination, and Environmental Justice in Amitav Ghosh's <i>The Hungry Tide</i> S. Peerani and N. Sheik Hameed	116508-116520
358	A "Scaffold Withdrawal" Protocol for AR, Enhanced Oracy in MID Classrooms V. S. Sreelakshmi, S. Vijayakumar and Sheik Hameed N.	116521-116529
359	The Living Land: Ecological and Cultural Dimensions of Land in Mamang Dai's Novels Sajana J. R and Muththamizh Selvi S. I.	116530-116534
360	Evaluating the Role of AI in Enhancing Academic Performance: A Study of Undergraduate Students in Tamil Nadu A. S. Mythili and R. Mayildurai	116535-116544
361	The Eloquence of Words: A Stylistic Analysis of Language in Advertising C. Chamundeshwari, S. U. Hari Krishna, and K. Vinothini	116545-116553
362	Project - Driven Language Development for Engineers: Transforming English Communication in Technical Education S. G. Mohanraj, B. Arokia Lawrence Vijay, and A. S. Mythili	116554-116560
363	Exploring the Educational Impact of Animated Storytelling on Children's Learning S. Mythili, K. Shreya, M. L. Rithika, N. Sri Nidhi, S. J. Subhiksha, and S. S. Rithikaa	116561-116567
364	Decoding the Embedded Plant Awareness in Folklore Among the Indigenous Naga Community V. Arunkumar, G. Beena, T. Sowmya, N. Umadevi, Chanyo Zimik, and Angelina L. Kikon	116568-116581
365	Structuring Reality through Language: Discourse Strategies in Media Communication C. Chamundeshwari, Tangudu Yogita Lakshmi, and T. S. Dhayaasre	116582-116588

366	Transforming Engineering Communication Skills: A Quantitative Study of Role Play, Self-Assessment, and Learner Autonomy A. S. Mythili, R. Hema, and S. G. Mohanra	116589-116596
367	Differentiated English Language Curriculum: An Outcome-Based Approach for First-Year Engineering Learners B. Arokia Lawrence Vijay, S. G. Mohanraj and R. Hema	116597-116603
366	Selfhood or Survival? Lavender Marriages and Trauma in Harshavardhan Kulkarni's <i>Badhaai Do</i> (2022) and Jeo Baby's <i>Kaathal – The Core</i> (2023) N. Madhusudan, T. S. Prasad Gowda, and M. Kamala Priya	116604-116609
367	Fostering Industry - Ready Engineers: Transforming English Language Education through Problem-based Learning S G Mohanraj, B. Arokia Lawrence Vijay and R Marudhachalam	116610-116618
368	Language Ideology and the Politics of Power in Society C. Chamundeshwari, Avula Narasimha and G. Hemanatchatra	116619-116626
369	Nurturing Analytical Thinking Competence in the English Language Classroom: A PBL Instructional Model R. Hema, A. S. Mythili, and B. Arokia Lawrence Vijay	116627-116635
370	Financial Market Forecasting : A Systematic Review of Technical Indicators, Regime Detection, Time-Series Decomposition and Feature Engineering (2019 – 2025) R.Harini and S. Rethinavalli	116636-116649
371	Regular Dominating Sets and Regular Domination Polynomials of Line Graph of Path Bibisa J and Freeda S	116650-116658
372	Cartesian Product on Bipolar Single -Valued Neutrosophic Graphs M. Lakshmi and T. Geetha	116659-116667
373	Operations on Majority Domination in Fuzzy Graphs T. Jeyaraj, A. Gracybaby and R. Irene Hepzibah	116668-116673
374	A Scalable and Robust End-to-End Neural Framework for Graph Matching Ashwani Kumar Yadav and Shri Prakash Dwivedi	116674-116685
375	Development and Characterization of Casein - Stearic Acid Based Biocomposite Film Saranya D and A Malar Retna	116686-116691
376	Measurement of Lumbar Intervertebral Disc Space at the L- L Segment using MRI Ekta Singh, Shiv Kailash Yadav, Viswanath Pratap Singh, Ankit Kumar, Shmriti, Pushpendra Kumar Rajput and Pankaj Kishor Mishra	116692-116698
377	Basic Life Support Knowledge and Awareness Among Undergraduate Allied Health Science Students : A Cross - Sectional Analytical Study Sanyyam Thakur, Muhammad Zubair, Priyanshi, Precila Laishram, Nilakshi, Rahul Kumar, Prince Giri, Prachi, Rajat Malik, Pankaj Kishor Mishra	116699-116709
378	An Analysis Study of Accurate Insight and type of Ovarian Cancer Complaint Circumstance using Hybridized Bacterial Rustling with Flyspeck Mass and Multi Kernel SVM Approach R.Nithya	116710-116717
379	Biofortification of Millets with Oyster Mushroom for Enhanced Zinc Bioavailability D.Sowmiya	116718-116731

380	The Study of Masculinities Portrayed In the Punjabi Film <i>Chann Pardesi</i> : A Psychological Persepective Ujjal Jeet	116732-116736
381	Correlation of Core Endurance and Lower Limb Strength with Performance in Adolescent Badminton Players Nitin Kumar Indora, Pooja Anand, Vipin Indora, Narendra Kumar and Neeraj Kumar	116737-116746

Editorial

Dear Readers,

In the 21st century, a nation's strength is no longer measured solely by its military capabilities; it is increasingly defined by its scientific, technological, and innovative capacity. In this context, India stands at a crucial turning point in its scientific and technological journey. Significant progress has been made in areas such as space exploration, artificial intelligence, biotechnology, quantum computing, semiconductor manufacturing, and renewable energy. However, transforming scientific advancements into sustainable economic growth and social development remains a formidable challenge.

Over the past few years, India has achieved remarkable milestones that have enhanced its global scientific reputation. The successful landing of Chandrayaan-3 near the Moon's south pole made India the first country to achieve this feat. Similarly, missions such as Aditya-L1, India's first dedicated solar observatory, the Gaganyaan human spaceflight programme, and the National Quantum Mission demonstrate the country's growing scientific capabilities. India has also significantly improved its position in the Global Innovation Index published by the World Intellectual Property Organization (WIPO). Furthermore, India has emerged as the world's third-largest startup ecosystem, reflecting its growing culture of innovation and entrepreneurship.

Despite these achievements, several structural challenges continue to hinder scientific progress. India's expenditure on Research and Development (R&D) remains around 0.65–0.70 percent of its Gross Domestic Product (GDP), considerably lower than countries such as South Korea, which invests over 4 percent, and the United States and Germany, which invest close to 3 percent of their GDP in R&D. This relatively low investment limits the development of fundamental scientific research, world-class laboratories, and breakthrough technologies. To accelerate scientific advancement, India must substantially increase public and private sector investment in research and innovation, with a long-term goal of raising R&D expenditure to at least 2 percent of GDP.

Another persistent challenge lies in the prevailing gap between academia and industry. Despite the thousands of research projects and scientific discoveries generated annually within Indian universities and research institutions, only a limited number successfully translate into commercial products or deliver tangible societal benefits. It is imperative to identify and address the structural, financial, and regulatory barriers that hinder the effective transfer of knowledge from research laboratories to the marketplace. The practical feasibility and scalability of many promising innovations must be carefully evaluated to ensure their successful commercialization. Strengthening university-industry collaborations, establishing dedicated technology transfer centers, expanding research parks, and fostering robust startup incubation ecosystems are essential measures to bridge this divide. Scientific discoveries must transcend the confines of laboratories and evolve into practical solutions that drive economic growth, address societal challenges, and improve the quality of life for citizens.

The healthcare and biotechnology sectors also hold immense potential for India's future growth. During the COVID-19 pandemic, India established itself as one of the world's leading vaccine manufacturers. Nevertheless, significant improvements are still needed in rural healthcare

infrastructure, genomics research, bioinformatics, personalized medicine, and AI-driven healthcare technologies. As the global market for AI-based healthcare solutions expands rapidly, India has a unique opportunity to position itself as a global hub for medical innovation and biotechnology.

In this context, the Fifth Science, Technology and Innovation Policy (STIP) is expected to play a pivotal role in shaping the nation's scientific future. The policy emphasizes open science, public participation, inclusion of women and youth in scientific activities, socially responsible research, and innovation-driven economic development. By democratizing access to scientific knowledge and fostering collaboration across sectors, the policy seeks to ensure that scientific discoveries are translated into tangible societal benefits.

At a time when global technological competition is becoming increasingly intense, India must evolve from being primarily a consumer of technology to becoming a creator of technology. Achieving this transformation will require robust investment in research, skilled human resources, strong industry partnerships, and evidence-based policy decisions. Ultimately, India's scientific future will not be determined solely by achievements in laboratories or space missions, but by its ability to convert scientific knowledge into solutions that enhance the quality of life for its people. A nation that successfully harnesses science for public welfare will emerge as a true scientific powerhouse.

— Editor in Chief

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Cover page image : Acraea terpsicore, commonly known as the Tawny Coster, female

Family :Nymphalidae

Image Credit : Priyadharshini V,