MAHATMA GANDHI VIDYAMANDIR'S

MAHARAJA SAYAJIRAO GAIKWAD ARTS, SCIENCE & COMMERCE

COLLEGE, MALEGAON CAMP

Awareness program

On

Mahatma Gandhi Vidyamandir Cluster University Foundation Process.

An awareness program On Mahatma Gandhi Vidyamandir Cluster University Foundation Process was organised in Maharaja Sayajirao Gaikwad Arts Science and Commerce College Malegaon Camp under the guidance of Principal Dr. Chandrakant G. Dighavkar, on Wednesday 11th September 2024. A special lecture on Programme Structure was delivered by the Academic Supervisor Dr. Manish Sonawane on this occasion. Dr. Manish Sonawane explained the New proposed Programme structure that will be implemented in Cluster University. He also explained the difference between the present Programme structure implemented by SPPU, Pune in accordance with the National Education policy 2020 (DSC)and the proposed Programme Structure (SSC) of Cluster University. He highlighted the chances for new courses to be introduced, especially in Humanities Stream. In his Presidential address Prin. Dr. Chandrakant Dighavkar stated the role and responsibilities of Cluster University. He also stated the importance of Cluster Universities in the forthcoming educational scenario in our country. Vice Principal Dr. Anil Savle explained the advantages of National Education Policy 2020 and the need for Cluster Universities in future.

In an interactive session the teachers raised their doubts which were clarified by the Principal and Vice Principal as well as the Academic Supervisor. The programme was organised by the NEP Coordination Committee. Dr. Bharati Khairnar was the master of the ceremony. Dr. Ramesh Nikam expressed the vote of thanks. All the faculty members of Arts, Science and Commerce attended the programme and actively participated in the discussion.

M.S.G. Arts, Science & Commerce College Malegaon Camp

PRINCIPAL
M.S.G. Arts, Science & Commerce
College, Malegaon Camp (Nashik)

NEP - 2020

Date - 11.9.

Awareness programme on Mahatma Gandhi Vidyamandir Cluster University found Process

A special lecture on Programm Structure organized by NEP-2020 Co-ordi Committee.

Attendance

1) Prin. Dr. Chandrakant G. Dighavkar -
2) Vice-principal Dr. Anil Salve
3) Academic supervisor Dr. Manish Sonawane
4) Dr. Pravin Patil

1)	Dr. B. P. Shewale	Dep English	
2)	Dr. R. V. Tribhuvan	-"-	
3)	Dr. Milind M. Ahire	English	
4)	Dr. V. S. Mistary	Commerce	
5)	Dr. U. K. Teke	Commerce	
6)	Pro. R. K. Binniwale	Commerce	
7)	Dr. R G shewale	Hindi	
8)	Dr V. D. Suryawanshi	Hindi	
9]	Dr. A. G. Nerkar	Marathi	
11]	Dr C. D. Rajput	Politics	
12)	Dr G. J. Bhamare	Marathi	
13)	Prof. Nana T. Ghuge	Marathi	
14	Dr. Konnar S G.	Marathi.	
15.	AJAY AHIR	History	
16)	Dr A. D. Pawar	Geo.	
17)	Dr. R. K. Jadhav	Eco:	
18)	Dr. J. D. Pawar	His.	
14)	Dr. S. A. Deore	Geo	
15)	Dr. A. D. Barizkar	Eng.	
16)	Prof Deepak Narayan Thakre	Geography	
17)	Dr. Vinod Gowadkar	Marathi	
18)	Tushar B. Shirole	History	
19)	[illegible]	[illegible]	

22	Mr. Pawar Hitesh Kondaji	Zoology	
23	Mr Deore Jaywant Nandkumar	Zoology	
24	Dr. K.T. Pati	Zoology	
25	Mr. P. D. Gaikwad	Zoology	
26	Bagade T. D.	Economics	
27	Mamude R. T.	Commerce	
28	Gaekal A. P.	Economics	
29	Do. Amit Kusliwal	Comp. Science	
30	Dr S. P. Deore	Economics	
31	Dr. S. M. Chinchole	Mathematics	
32	Dr. K S Ahire	—11—	
33	Prof. R. A. Pawar	—11—	
34	Dr. K.N. Nalawade	Economics	
35	Prof Dilip A. Jagtap	Economics	
36	Mr. R.B. Pawar	Economics	
37	Mr. B.H. Bhamare	Economics	
38	mr. G.B Yelmame	chemistry	
39	Dr. C. S. Aher	Chemistry	
40	Mr. C.R. Yewale	Physics	
41	Dr. J T Jadhav	Botany	
42	Dr R N Nikam	Psychology	
43	Dr. N.B. Suryam	Chem.	
44	Miss. Chaudhari H.S	Statistics	
45	Ms. P.M. Pawar	Zoology	
46	Ms. V.T. Salunke	Ele. Sci.	
47	Miss. M. H. Thoke	physics	
48	Dr. S.V. Sonavane	Marathi	
50	Miss Komal H Kale	Commerce	
51	Asst Prof Ameapali V. Patil	Commerce	
52	Dr. Bharati Khairnar	English	

सावित्रीबाई फुले पुणे विद्यापीठ

गणेशखिंड, पुणे - ४११००७

Savitribai Phule Pune University

Ganeshkhind, Pune - 411007

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शैक्षणिक विभाग (मान्यता कक्ष)
Academic Section (Approval Cell)
संकेतस्थळ/ Website: www.unipune.ac.in

संदर्भ क्र : सीबी/ ५०१

दिनांक : १४/०६/२०२४

प्रति,

मा. प्राचार्य/ मा. संचालक,
संलग्न महाविद्यालये (स्वायत्त महाविद्यालयांसह)/मान्यताप्राप्त परिसंस्था,
प्रस्तुत विद्यापीठ

विषय :– राष्ट्रीय शैक्षणिक धोरण २०२० ची राज्यातील अंमलबजावणीच्या अनुषंगाने महाविद्यालय स्तरावरील एनईपी सेलबाबत.....

महोदय/महोदया,

शिक्षण संचालक (उच्च शिक्षण) महाराष्ट्र राज्य, पुणे – १६ यांचे पत्र संदर्भ क्र. युएनआय/(१३६/२२)/विशि–१/भाग–३/२५५९, दि. ३० एप्रिल, २०२४ रोजीच्या पत्रान्वये विद्यापीठाने परिपत्रक क्र. ११८/२०२४ नुसार सर्व संबंधितांस महाविद्यालय स्तरावरील एनईपी सेलची रचना, कर्तव्ये व जबाबदाऱ्यांबाबत अवगत केले होते.

सदर परिपत्रकाचा आशय लक्षात घेऊन आपल्या संलग्न महाविद्यालये (स्वायत्त महाविद्यालयांसह)/मान्यताप्राप्त परिसंस्थेमधील एनईपी सेलबाबतची माहिती विद्यापीठाच्या खालील संकेतस्थळावर लवकरात लवकर भरावी. तसेच यापुढे ही या माहितीमध्ये काही बदल झाल्यास वेळोवेळी सदर संकेतस्थळावर अद्ययावत करण्यात यावा.

BOD Online -- Login(College Username & Password) -- Important Links -- NEP Cell

कळावे,

आपला,
14/6/2024
(स. द. डावखर)
उपकुलसचिव

To
Mr. Pravin Patil
Academic Sup.
20/06/2024

M.G.VIDYAMANDIR'S

M.S.G. COLLEGE, MALEGAON CAMP, DIST. NASHIK

REPORT

OND DAY WORKSHOP ON SCHOOL CONNECT AND NEP 2020

Organized by

M.S.G. College in collaboration with Mahatma Gandhi Vidyamandir, Nashik

As per the instructions received from M.G. vidyamandir's letter No MGVN / 3531/2023-2024 dated 16/01/2024 our college had organized one day Workshop on 3/2/2024 on **School Connect and NEP 2020** in collaboration with M.G.Vidyamandir and K.B.H. JR. College, Malegaon Camp and R. B. H. JR. College Malegaon Camp. Prin. Dr. Chandrakant G. Dighavkar was the resource person for this workshop. Prin. Dighavkar very extensively highlighted all the aspects of NEP 2020 . He also elaborated the need and the role of parents, students, teachers, Institutions, administrators and society in the implementation of NEP 2020. Vice Prin. Dr. T.S. Savale also expressed his ideas for the implementation of NEP 2020. Vice Prin. Prof. M.M. Kulkarni, Academic Supervisor Prof. R.A.More, Prof. Ramesh Nikam also expressed their views on NEP 2020. Prof. Milind Pawar anchored the programme and Prof. Ramesh Nikam expressed the vote of thanks.

M.S.G. Arts, Science & Commerce College Malegaon Camp

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M.G.VIDYAMANDIR'S

M.S.G. COLLEGE, MALEGAON CAMP, DIST. NASHIK

REPORT

OND DAY WORKSHOP ON IMPLEMENTATION OF NEP 2020

Organized by

M.S.G. College in collaboration with Mahatma Gandhi Vidyamandir, Nashik

As per the instructions received from M.G. vidyamandir's letter No MGVN / 3531/2023-2024 dated 16/01/2024 our college had organized one day Workshop on **Implementation of NEP 2020** in collaboration with M.G.Vidyamandir and Internal Quality Assurance Cell of the college . The workshop was organized separately for science faculty on 19/ 01/2024 and for Arts and Commerce faculty with Junior college teachers on 25/01/2024. Each workshop began with the inaugural function followed by three different sessions and concluded with valedictory function. The experts from Mahatma Gandhi Vidyamandir's L.V. H. College, Nashik were invited as resource persons. The expert team included Prin.Dr. B. S. Jagdale, Prof. Dr. P-G. Ambekar, Prof. Dr. V.R. Nikam, and Prof. Dr Jayashree Bhalerao. Both the workshops were inaugurated by Hon. Prin. Dr. C.G. Dighavkar. In the first session, Prof. Dr. Ambekar delivered a talk on "Distribution of Syllabi" as per the guidelines of NEP 2020. He highlighted the various groups of Courses that the students need to choose at the entry level. In the second session Prof. Dr. V.R. Nikam Spoke about the importance of "School Connet Campaign." He highlighted the importance of connecting all the peers: students, Parents, teachers, administrators and educators for the effective implementation of NEP 2020.

In the third session Prof. Dr Jayashree Bhalerao spoke on "Connecting Skill component To OBE from school to UG". Dr Bhalerao explained the innovative Pedagogies and their effective implementation. By giving day to day examples, she made the session very interesting. In the fourth session Prin. Dr. B S. Jagdale highlighted the National Education Policy 2020 and its effective implementation. He urged the teachers to take NEP 2020 as a challenge. In the valedictory function of the workshop organized for Science faculty Prof. S. I. Ansari expressed vote of thanks and vice-Principal Dr. M.B. Sonawane expressed Vote of thanks in the workshop organized for Arts and commerce faculty. Vice-Prin. Dr. T. S. Salve, IQAC Coordinator Dr S.I. Ansari, NAAC Co-ordinator Dr. K.S. Kokane all the faculty Members of Arts, commerce, and science faculty atrended the workshops. The faculty members of M.P.H.M. Mahavidyalaya, A.S.C. College, Malegaon City, S.P. H. Pharmacy College, Malegaon camp, K.B.H.Law College, Malegaon Camp, College of Education, Malegaon camp, College of Agriculture, S.P.H. College of Management and Technology Participated in these workshops. Dr.S.I. Ansari anchored the workshop for Science faculty and Prof. R.v. Tribhuvan anchored the workshop of Arts and commerce faculty. Total 130 Participants in Workshop for science faculty and 225 Participants in Arts and Commerce and Junior college faculty actively participated in these workshops.

M.S.G. Arts, Science & Commerce College Malegaon Camp

PRINCIPAL
M.S.G. Arts, Science & Commerce College, Malegaon Camp (Nashik)

संस्थापक

कर्मवीर भाऊसाहेब हिरे

महात्मा गांधी विद्यामंदिर, नाशिक संचलित

महाराजा सयाजीराव गायकवाड

कला, विज्ञान व वाणिज्य महाविद्यालय

सावित्रीबाई फुले पुणे विद्यापीठ, पुणे संलग्न क्र. पी.यू./एन.एस./ए.एस.सी./००४ (१९५९)

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जावक क्रमांक : ७८४/२०२३-२०२४,

दिनांक : १८/०१/२०२४

प्रति,
मा.विश्वस्त सो.,
शैक्षणिक व परीक्षा विभाग,
महात्मा गांधी विद्यामंदिर,
पंचवटी, नाशिक - ३

विषय :- नवीन शैक्षणिक धोरण-२०२० च्या कार्यशाळेसाठी मार्गदर्शक उपलब्ध करून देणेबाबत

संदर्भ :- मा.जॉईन्ट सेक्रेटरी, महात्मा गांधी विद्यामंदिर, पंचवटी, नाशिक यांचेकडील पत्र जा.क्र.एमजीव्हीएन/३५३१/२०२३-२०२४, दि.१६/०१/२०२४

महोदय,

वरील संदर्भिय विषयान्वये आपणांस सादर करण्यात येते की, या महाविद्यालयात नवीन शैक्षणिक धोरण-२०२० बाबत कार्यशाळेचे आयोजन गुरूवार, दि.२५ जानेवारी, २०२४ रोजी करण्यात आलेले आहे. या कार्यशाळेकरीता आम्हाला तज्ञ मार्गदर्शक उपलब्ध करून द्यावा, जेणेकरून नवीन शैक्षणिक धोरण-२०२० बाबत सखोल माहिती उपस्थित होणारे पालक व विद्यार्थी यांना होईल.

तरी आम्हाला नवीन शैक्षणिक धोरण-२०२० च्या कार्यशाळेसाठी तज्ञ मार्गदर्शक उपलब्ध करून देणेस नम्र विनती.

म.कळावे,

आपला विश्वासू,

(डॉ. सी. जी. दिघावकर)
प्राचार्य
म.स.गा. कला, वाणिज्य व विज्ञान
महाविद्यालय, मालेगांव कॅम्प (नाशिक)

महात्मा गांधी विद्यामंदिर व आदिवासी सेवा समिती, नाशिक
शैक्षणिक व परीक्षा विभाग
६ वा मजला, के .बी. एच. दत महाविद्यालय व रुग्णालय इमारत ,
मुंबई आग्रा रोड-पंचवटी नाशिक – ३

जावक क्रमांक: एमजीव्हीएन/३५३१/२०२३-२०२४ दिनांक:- १६/०१/२०२४

-: परिपत्रक :-

प्रति,
संस्था संचालित मा. प्राचार्य,
उच्च व तंत्र शिक्षण विभाग.

मा. महोदय,

संस्थेच्या उच्च व तंत्रशिक्षण विभागांतर्गत येणाऱ्या पारंपरिक व व्यावसायिक महाविद्यालयाच्या प्राचार्य संचालक यांना या परिपत्रकाद्वारे सूचित करण्यात येते की, महाराष्ट्र शासन निर्णय क्रमांक : संकिर्ण-२०२४ प्र.क्र ०१ विशि-३, दिनांक : ५ जानेवारी २०२४ नुसार राज्यात राष्ट्रीय शैक्षणिक धारण २०२० ची अंमलबजावणी शैक्षणिक वर्ष २०२३-२४ पासून पदव्युत्तर अभ्यासक्रमासाठी सुरू झाली आहे. तसेच येत्या शैक्षणिक वर्ष २०२४-२५ पासून पदवी स्तराचर अंमलबजावणी करण्यात येणार आहे.

भविष्यातील संधींना सामोरे जाण्यासाठीची क्षमता विद्यार्थ्यांमध्ये निर्माण व्हावी म्हणून या धारणात अनेक बदलांचा समावेश आहे. त्याचाच एक भाग म्हणून शासनाने समूह विद्यापीठ, स्वायत्त संस्था आणि स्वयं-अर्थ सहाय्यित विद्यापीठ इत्यादींच्या निर्मितीची प्रक्रिया सुरू करण्याचा निर्णय घेतला आहे. याद्वारे राज्यातील मोठा विस्तार असणाऱ्या आणि विद्यार्थ्यांपर्यंत पोहचू शकणाऱ्या संस्थाना वरील प्रमाण विद्यापीठ निर्मितीची संधी उपलब्ध करून दिलेली आहे. या दिशेने वाटचाल करण्यासाठीचे पहिले पाऊल नाशिक जिल्ह्यातून आपल्या महात्मा गांधी विद्यामंदिर या संस्थेने उचलण्याचे ठरवले आहे. त्या अनुषंगाने आपली संस्था समूह विद्यापीठ प्रस्तावित करण्यास उत्सुक आहे, हे आपणास ज्ञात आहेच.

राष्ट्रीय शैक्षणिक धारणात अंतर्भूत असणारी सर्वांगीण विकासाची तत्वे निर्धारित असणाऱ्या सर्वच घटकापर्यंत पोहचविण्याची जबाबदारी केवळ शासनाची नसून शिक्षण क्षेत्रातील एक महत्त्वाचा भाग म्हणून आपल्यावरही आहे. यासंदर्भात संस्थेच्या वतीने सर्व प्राध्यापकांसाठी राष्ट्रीय शैक्षणिक धारण २०२० बाबत जाणीव जागृती, प्रवेश निश्चिती, कार्यभार अभ्यासक्रम संरचना, इत्यादी बाबत मार्गदर्शनपर कार्यशाळेचे आयोजन करण्यात येत आहे. परंतु याबरोबरच प्रथम वर्ष पदवीच्या प्रवेश निश्चितीसाठी ११ वी व १२ वीच्या विद्यार्थ्यांमध्ये व त्याच्या पालकांमध्ये राष्ट्रीय शैक्षणिक धारण २०२० विषयी जाणीव जागृती करणे आणि आपल्या महाविद्यालयात त्या अनुषंगाने असणाऱ्या सोयी सुविधा त्यांच्यापर्यंत पोहचवणे ही आपली जबाबदारी आहे. यानिमित्ताने आपण आपल्याकडे असणाऱ्या सर्वोत्तम सुविधा आणि इतर महाविद्यालयांपेक्षा आपली वरचढ असणारी बाजू त्यांच्या निदर्शनास आणून द्याची जेणेकरून विद्यार्थी व पालकांचा कल आपल्या महाविद्यालयात प्रवेश घेण्याकडे सकारात्मक असेल. आपले महाविद्यालय या धारणांतर्गत सर्वांगीण विकासासाठी कोणत उपक्रम राबवणार आहे आणि त्याचा त्यांना कसा फायदा होणार आहे हे विशेषत्वाने विशद करणे यासाठी उत्कृष्ट प्रकार एकदिवसीय कार्यशाळेच आयोजन करून या संदर्भातील सर्वंकष माहिती विद्यार्थी व पालकापर्यंत दिनांक १५ जानेवारी ते ३१ जानेवारी २०२४ पूर्वी पोचवावी. या कार्यशाळेत संस्थेने समूह विद्यापीठ स्थापन करण्यासंदर्भात सुरू केलेल्या हालचालींचीही माहिती आपल्याला विद्यार्थी आणि पालकापर्यंत पोहचवता येऊ शकते. तसेच आपल्या महाविद्यालयाच्या जवळपासच्या कनिष्ठ महाविद्यालयात जाऊन NEP-२०२० आणि संस्थेविषयीची जागृती निर्माण करावी. त्याचा उपयोग पुढील प्रवेश निश्चितीसाठी करता येईल. सदर कार्यशाळेसाठी मार्गदर्शक उपलब्ध होण्यासंदर्भात संस्थेच्या उच्च शिक्षण विभागाकडे संपर्क करावा. आयोजनानंतर सहभागी विद्यार्थी, पालक यांच्या प्रतिक्रियांसह सविस्तर अहवाल संस्थेच्या उच्च शिक्षण विभागाकडे दिनांक ५ फेब्रुवारी २०२४ पर्यंत सादर करावा.

या कार्यशाळेचे आयोजन सर्वच शाखांना बंधनकारक आहे याची कृपया नोंद घ्यावी.

(डॉ. व्ही. एम. मोरे)

सकाळ

नवीन शैक्षणिक धोरणातून विविध संधी : डॉ. अंजूम

मालेगाव शहर : राष्ट्रीय शैक्षणिक धोरण हे गुणवत्तापूरक शिक्षणाच्या संधी पुरविण्यात सक्षम असून, या धोरणात रोजगाराच्या अनेक संधी उपलब्ध होतील. या धोरणात विज्ञान-तंत्रज्ञानाबरोबरच, समाज संस्कृती आणि प्रगती साधनाच्या संधीही उपलब्ध होतील. विद्यार्थ्यांना मातृभाषा, तसेच इतर भाषांतूनही शिक्षणाच्या संधी उपलब्ध होतील, असे मत सीटी महाविद्यालयाचे प्राचार्य डॉ. आरिफ अंजूम यांनी केले. महात्मा गांधी विद्यामंदिर संचलित मालेगाव कॅम्प येथील महाराजा सयाजी महाराज गायकवाड कला, विज्ञान व वाणिज्य महाविद्यालयात स्टाफ अॅकॅडमीच्या उद्घाटनानिमित्त 'राष्ट्रीय शैक्षणिक धोरण-२०२०' या विषयावर डॉ. अंजूम यांचे व्याख्यान झाले. त्यावेळी ते बोलत होते. डॉ. अंजूम यांनी या धोरणातील विविध बाबी स्पष्ट करून सांगितल्या. प्राचार्य डॉ. चंद्रकांत दिघावकर यांच्या मार्गदर्शनाखाली हा कार्यक्रम झाला. उपप्राचार्य डॉ. अनिल सावळे, उपप्राचार्या डॉ. मनीष सोनवणे, शैक्षणिक पर्यवेक्षक डॉ. प्रवीण पाटील या वेळी उपस्थित होते. एनईपी समन्वयक डॉ. भारती खैरनार यांनी प्रास्ताविक केले. डॉ. सी. डी. राजपूत यांनी सूत्रसंचालन केले. प्रा. एस. एल. आहिरे यांनी आभार मानले.

Nashik, Malegaon
31/07/2023 Page No. 4

राष्ट्रीय शैक्षणिक धोरण २०२० गुणवत्ता पूरक शिक्षणाच्या संधी पुरवण्यास सक्षम-डॉ.आरीफ अंजुम

मालेगाव कॅम्प : महात्मा गांधी विद्यामंदिर संचलित महाराज सयाजीराव गायकवाड कला, विज्ञान व वाणिज्य महाविद्यालय मालेगाव कॅम्प येथे स्टाफ अकॅडमीच्या उद्घाटन प्रसंगी राष्ट्रीय शैक्षणिक धोरण २०२० या विषयावर महाविद्यालयाचे प्राचार्य डॉ.चंद्रकांत दिघावकर यांच्या मार्गदर्शनाने व्याख्यान आयोजित करण्यात आले होते.

याप्रसंगी प्रमुख व्याख्याते सिटी महाविद्यालयाचे प्राचार्य डॉ. आरिफ अंजुम ते होते या प्रसंगी ते म्हणाले की राष्ट्रीय शैक्षणिक धोरण २०-२० हे गुणवत्ता पूरक शिक्षणाच्या संधी पुरवण्यात सक्षम असून या धोरणामध्ये अनेक रोजगाराच्या संधी उपलब्ध होतील तसेच या धोरणामध्ये विज्ञान-तंत्रज्ञाना बरोबरच, समाज संस्कृती आणि प्रगती साधनाच्या संधी देखील

उपलब्ध होतील. विद्यार्थ्यांना मातृभाषा तसेच इतर भाषेतून देखील शिक्षणाच्या संधी उपलब्ध होतील असे ते म्हणाले.

या वेळी महाविद्यालयाचे प्राचार्य डॉ.चंद्रकांत दिघावकर यांनी राष्ट्रीय शैक्षणिक धोरण २०-२० याकडे आपण सकारात्मक दृष्टीने बघणे व शिक्षण क्षेत्रात येणाऱ्या नवीन आव्हानांचा स्वीकार करणे गरजेचे आहे असे मत व्यक्त केले.

याप्रसंगी महाविद्यालयाचे उपप्राचार्य डॉ. अनिल सावळे, उपप्राचार्य डॉ. मनीष सोनवणे शैक्षणिक पर्यवेक्षक डॉ.प्रवीण पाटील यांच्यासह महाविद्यालयातील प्राध्यापक बंधू-भगिनी उपस्थित होते, या कार्यक्रमाचे प्रास्ताविक इंग्रजी विभागप्रमुख तथा एनइपी कॉर्डिनेटर डॉ. भारती खैरनार यांनी केले तर सूत्रसंचालन डॉ. सी .डी .राजपूत यांनी तर आभार प्रदर्शन प्रा. एस .एल. आहिरे यांनी मानले.

M.G.VIDYAMANDIR'S

M.S.G.COLLEGE, MALEGAON CAMP, DIST. NASHIK

REPORT

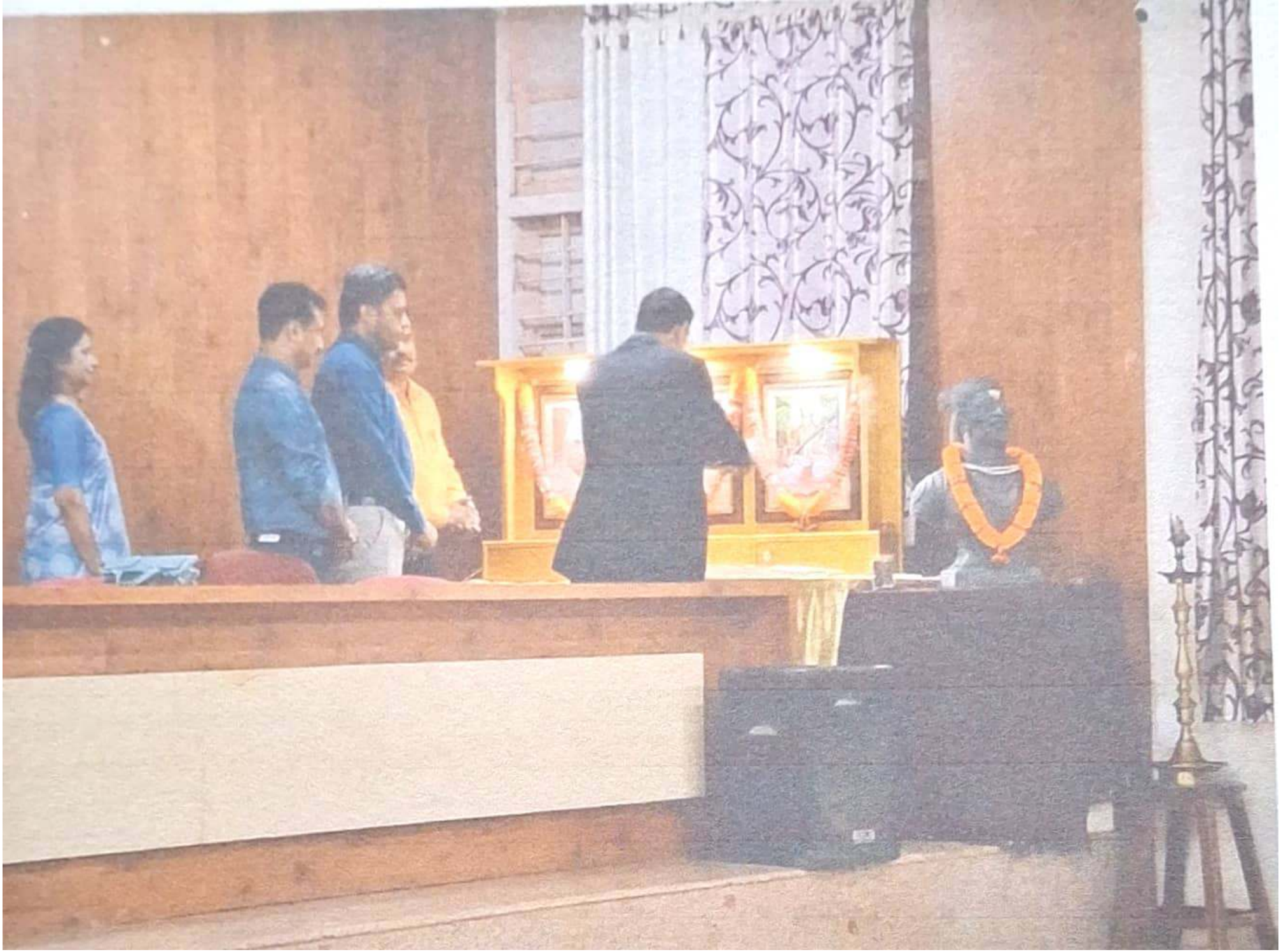
GUEST LECTURE ON NATIONAL EDUCATION POLICY 2020

DATE:27/07/2023

A Guest lecture on National Education Policy 2020 was organised on Thursday, 27th July 2023. Prin. Dr. Aarif Anjum, Principal, Arts Commerce and Science College, Malegaon City was invited as a chief guest to deliver the lecture on National Education Policy 2020 Implementation in Higher Education. Dr. Aarif Anjum stated that national Education Policy 2020 will provide the opportunities of quality education and equal opportunities in employability. He also opined that National Education Policy 2020 highlighted the importance of Science and Technology along with the sustenance of Indian culture, ethos, and Indian Knowledge System. He said that it would be an opportunity to the learners to get education through Mother tongue and local, regional languages. It would provide them deep knowledge of the subject in an easy way. Principal Dr. C.G. Dighavkar in his presidential address stated that there is a need to consider the National Education Policy 2020 in a positive manner and to be ready to face the challenges of the new era. He also stated that it would be essential to implement the National Education Policy 2020 in order to stay in the global competition. On this occasion Vice Principal Dr. T.S. Savle, Vice Principal Dr. Manish Sonawane, Academic Supervisor Dr. Pravin Patil expressed their views on implementation of National Education Policy 2020. NEP Committee Co Ordinator Dr. Bharati Khairnar welcomed the guests and explained the purpose of organising the function. Dr. C.D. Rajput was the master of the ceremony. Dr. S.L. Ahire expressed the vote of thanks. All the teaching faculty members and Non-teaching staff members attended the function.

Dr. C. G. Dighavkar
Principal
M.S.G.Arts Sci & Comm.College
Malegaon Camp (Nashik)

Dr. Bharati Khairnar



M.G.Vidyamandirs

M.S.G Arts Science and Commerce College, Malegaon Camp

Inaugural Ceremony of Staff Academy

Guest Lecture on

NATIONAL EDUCATION POLICY 2020

2023-2024

- **Welcome**
- **Deep Prajwalan by the hands of all Invitees**
- **Felicitation of Chief Guest by the Principal**
- **Introduction of the Programme – Dr.Bharati Khairnar**
- **Resource Person – Dr.Arif Anjum**
- **Presidential Address – Prin. Dr. C.G.Dighavkar**
- **Vote of Thanks - Mr. S. L. Ahire**
- **Comparing - Dr. C.D.Rajput**

Venue : Loknete Vyankatrao Hirey Auditorium
Day & Date : Thursday 27 July 2023
Time : 10.00 am

Founder

Karmaveer Bhausaheb Hiray

Mahatma Gandhi Vidyamandir's
MAHARAJA SAYAJIRAO GAIKWAD
Arts, Science & Commerce College
• e-mail : msgcollege@rediffmail.com prin.msgcollege@mgvnasik.org

Affiliated to Pune University Id. No. PU/NS/ASC/004 (1959)

Outward No : 2023-24/ 282 Date : 26/07/2023

To,
Prin.Dr.Arif Anjum.
Principal,
Arts, Commerce and Science
College, Malegaon City, Malegaon.

Sub. :- Invitation as a Guest Lecturer.....

Respected Sir,

We are pleased to invite you as a Chief Guest to deliver a lecturer on **National Education Policy 2020** on Thursday, 27th July 2023. You are requested to kindly accept the invitation and deliver a lecture on the above said topic.

Thanks and regard.

Time : 10:00 am

Venue : L.V.H. Seminar Hall,
M.S.G. College, Malegon Camp

Dr. Bharati Khairnar

(Dr. C. G. Dighavkar)
Principal
M S.G.Arts Sci & Comm.College
Malegaon Camp (Nashik)

Loknete Vyankatrao Hiray Marg, Malegaon Camp - 423 105 **Office Ph.**: 02554-252077, 252078

Founder

Karmaveer Bhausaheb Hiray

Mahatma Gandhi Vidyamandir's

MAHARAJA SAYAJIRAO GAIKWAD

Arts, Science & Commerce College

• e-mail : msgcollege@rediffmail.com prin.msgcollege@mgvnasik.org

Affiliated to Pune University Id. No. PU/NS/ASC/004 (1959)

Outward No : 2023-24/283 Date : 27/07/2023

To,
Prin.Dr.Arif Anjum.
Principal,
Arts, Commerce and Science
College, Malegaon City, Malegaon.

Sub. :- Letter of Gratitude …

Respected Sir,

We express our heartfelt gratitude to you for accepting our invitation as a guest lecturer and delivering a lecture on the topic **National Education Policy 2020** on Thursday, 27th July 2023. We sincerely appreciate your support and involvement.

Thanks and regard.

Dr. Bharati Khairnar

(Dr. C. G. Dighavkar)
Principal
M.S.G.Arts Sci & Comm.College
Malegaon Camp (Nashik)

Loknete Vyankatrao Hiray Marg, Malegaon Camp - 423 105 **Office Ph.**: 02554-252077, 252078

Mahatma Gandhi Vidyamandir's

Maharaja Sayajirao Gaikwad Arts, Science and Commerce College,

Malegaon-Camp Dist.Nashik

Notice

Date : 26/07/2023

All the Teaching Staff members are hereby informed that a Guest Lecture on **"National Education Policy 2020"** is organized on Thursday, 27th July 2023. Prin. Dr.Arif Anjum, Principal, Arts, Commerce and Science College, Malegaon City is invited as the Chief Guest to deliver the lecture on the above mentioned topic. It is mandatory for all staff members to attend the lecture.

(Dr. C. G. Dighavkar)

Principal

S.G.Arts Sci & Comm.College

Malegaon Camp (Nashik)

District-Nashik

Date-07.10.2024

Sr.No.	Name of The College	Mobile No.	Sign
1	HPT/RYK College, Nashik	9657389195	
2	BYK College of Commerce	8805832519	
3	RNC College Nashik Road	9881168742	
4	NBT Law College, Nashik	9420612103	
5	B.Ed. College Sangamner	9272546373	
6	B.Ed. College Nashik	9689084060	
7	Arts comm Science Tryambkeshwar	9960373588	
8	Ozar College	8999360215	
9	J.A.T. Mahila Col Malegaon	9765287214	
10	SMRK College Nashik	9765681662	
11	ASC Manmad College	9766654689	
12	ASC Nimgaon College	9420905768	Akoli.
13	Deola College	9922333B8	
14	BNJB Chandwad College	9028213248	
15	Lasalgaon College	9822374929	
16	Bhonsala Military College	9881642068	
17	K.S.K.W. Arts Sci Com/ Cidco	9960895850	
18	Art. com. & Sci College Nandgaon	9028357204	
19	JMD Sinnar	9011926207	
20	KTHM College Nashik	9850961799	
21	KGDM College, Nidhal	9470094314	
22	K.K.W College, Pimpalgaon (B)	7387104004	
23	S.V.K.T. College, Deolali Camp	9823591620	
24	MVP. Sindori. College	9637645806	
25	Saikheda College	9096413154	
26	Arts & Com. College Yeola	9765382358	
27	K.R.T. Arts & Com college, Vani	8830758608	
28	A.S.C. College Harsul.	7666369239	
29	L.V.H. pancharth Nashik	9423699898	
30	ASC. College Surgana	7588173967	
31	K.B.H Law College malegaon	9369900488	Bhosale
32)	Malegaon city college.	9881856517	
33)	KPG Igatpuri	9011109197	

District-Nashik

Date-07.10.2024

Sr.No.	Name of The College	Mobile No.	Sign
31	Navjeevan Law College	8600585588	[signature]
32	K.V.N.Naik Nashik	9850060005	[signature]
33	K.V.N. Naik Dindori	9922263414	[signature]
34	[illegible] college [illegible]	9[illegible]2393[illegible]	[signature]
35	M.J.M ACS college Karanjali	9420002050	[signature]
36	A.C.S. College, Kalwan	8678303101	[signature]
37	A.C.S College Abhona	9423931151	[signature]
38	LBRD Mahila Mahavidyalaya	9403512930	[signature]
39	S.M College Yeola	9881917131	[signature]
40	Satana College.	9921229175	[signature]
41	[illegible]	9112180490	[signature]
42	M.S.G.College, Malegaon	7020799917	[signature]
43	S.P.H.Mahila college Malegaon	7972001771	[signature]
44			
45			
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49			
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Mahatma Gandhi Vidyamandir's

Maharaja Sayajirao Gaikwad Arts, Science and Commerce College, Malegaon- Camp – Dist. Nashik

One Day Workshop on Sevarth

Registration

Date: 07/10/2024

Sr. No.	Name of the College	Name of the Employee	Mobile No	Sign
1.	SNJB ACS College, Chandwad	Mr. S. K. Byrad	9028313243	[signature]
2.	KRK ACS College Deola	Mr. D. R. Aher	9922338878	[signature]
3.	Arts, Com. & Science College, Lasalgaon	Mr. D. E. Thorat	9822374929	[signature]
4.	K. G. D. M College, Niphad.	Shri. Sonare S. S.	9970094314	[signature]
5.	Bhonsala Military College Nashik	Mr. M. N. Mahajan	9881602065	[signature]
6	KSKW ASC Sci Com College Cidco	Thakare K.S.	9960895850	[signature]
7	[illegible]	M. S. Chavan	9112180490	[signature]
8	SM College Yeola	Ambe S.B.	9881917631	[signature]
9	M.V.P. ACS College, Dindori	Mr. S. U. Sangamnere	9637695806	[signature]
10	K.R.T. ACS College, Vani	Mr. L. M. Golait	8830758608	[signature]
11	ASC Saikheda College	Mr. M. D. Kharat	9096413154	[signature]

Mahatma Gandhi Vidyamandir's

Maharaja Sayajirao Gaikwad Arts, Science and Commerce College, Malegaon- Camp – Dist. Nashik

One Day Workshop on Sevarth

Registration

Date: 07/10/2024

Sr. No.	Name of the College	Name of the Employee	Mobile No	Sign
12	KKW College Pimpalgaon(B	Bongale. G. B	7387104002	Bongale
13	Arts & com. college Yeola	Pagare G. G	9765382386	
14	Arts & sci. com. Nandgaon	Gangurde S. W	9028353202	
15	S.P.H. mahila college mlg	Dipak Sawant	7972001771	
16	A.S.C. college	Akshay kachave	8087493370	
17	KAANMSonawane ACSC Satana	Borase Shailesh	9921229175	
18	LBRD Mahila Mahavidyalaya, Nashik Road.	R. M. Thombare	9403512930	Thombare
19	Arts sci & comm. college Sangamner	M. Z Deshmukh	7588173967	
20	K.B.H. Law college malegaon	U.A. Bhoye	9359800453	
21	Navjeevan Law College, Nasik	A.A. Umbarkar	8600585808	AUmbar
22	Dr. vijay Bidkar college Abhone	R. P. Pagare	9423931151	

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One Day Workshop on Sevarth

Registration

Date: 07/10/2024

Sr. No.	Name of the College	Name of the Employee	Mobile No	Sign
23	Arts. Com. & Sci. College, Kalwan	R. D. Sabale	8698303109	R Sabale
24	Dadasaheb Bidkar Arts, Science & Comm College, Peth	Shri. K. B. Nikam	9423933450	
25	MJM ACS College Karanjali Tal peth Dist Nashik	Gawali V.C	9420002030	
26	S.P.H. Arts, Science & Commerce College Nampur.	Ramprasad S. Pathl	7350660061	R S Pathl.

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon
Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
1)	Shaikh Tuba k. Aslam	Maths	
2)	Shinde gaytri Dipak	Maths	
3)	Thoke Niyati Sharad	Botany	
4)	Gurav Nupur Rohidas	Botany	
5)	Patil Pragati Rajendra	Botany	
6)	Kambale Mrunal Vishnu	Botany	
7)	Dhepe Manjusha Vishal	Botany	
8)	Jagtap Roshan Bhausaheb	Economics	
9)	Kumbhar Dinesh Nanu	Economics	
10)	Chavan Kalyani Jitendra	Economics	
11)	Ingale Vaishnavi mothabhy	History	
12	Gosavi chandrakant Prakash	computer science	
13	Kalpesh Bharatgadhav	engeering & technology	
14.	Uday Sanjay Gawali	computer science	
15.	Pradip Yuvaraj Kannor	—	
16	Bhamare Akash Anil	Statistics	
17	Nikwade Satyam Jitendra	physics	
18	Vedant Chandan Shelke	Physics	

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon
Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
01)	Afifa Farheen Md. Ghufran	physics MSC-II	
02)	siddiqui Naima Firdaus Md. Israil.	physics MSC-II	
03	Ansari Sadeqa Sadaf Jaleel Ahmed.	MAENG [I]	
4)	Bhodane sakshi madhukar	MSC. 1st	
5)	Harshada suresh kadam	M.Sc. II (Phy)	
6	Jagruti Khushal Chavan	M.Sc. II (Phy)	
7)	Subhangi Shridhar Borase	M.Sc. II (Phy)	
8)	Nikam Gayatri Nitin	M.S.C. II (zoology)	
9)	Kannor Dnyaneshwari Ambadas	MSC - II (zoology)	
10)	Jadhav Rind Somnath	Fy.BSC	
11)	Kadam Apurva Bhojraj	TY BCS	
12)	Roundal Vandana Bajirao	fy. B.Sc	
13)	wagh poonam Nandalal	TYBCS	
14)	~~Kadam Apurva Bhojraj~~		
15)	shirode shweta janardan	TYBCS	
15)	Wagh Kunal Rajendra	TYBSC	
16)	Sagar Kartik	-U-	
17)	Abubakar Akhlaque Ahmad	MA-I	
18)	Ishtiyaque Ah Rafeeque Ah	M.A-II	
19)	Hire Pranav Subhash	T.Y. BSC	

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon
Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
1)	L. G. Pagare	commerce	
2)	Dr. S. C. Kulkarni	Electronics	
3	Komal H Kale	Commerce	
4)	Ms. P. M. Pawar	Zoology	
5)	Miss. M. H. Thoke	physics	
6)	Miss H. S. Chaudhari	Statistics	
7	Dr. Bharati Khairnar	English	
8	S. M. Jagtap	Comp.Sci	
9	K. V. Shinde	Comp Sci	
10.	S.B. Badhav	Compsci	
11	S. P. Patil	Compsci	
12	N. S. Hyalij	compsci.	
13	N. G. Kothawade	Physics	
14)	K.D. Suryawanshi	Zoology	
15)	Ms. Shelke Swati Mothabhau	Physics	
16)	Miss Projakta Borse	Comp Sci	
17	S. P. Mehgar	-11-	
18	Ujwala Ahire	Marathi	
19	Miss Mayuri B. Mohan	Comp Sci	
20	Miss Vinita S. Nikam	-11-	

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon
Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
1.	Momin Sharmeen Riyazulhas	Chemistry	
2)	Kakiij Shubhangi Vasant	Fy.bcs	
3)	Bangar Akshra Dipak	Fy.bCS	
4)	Pawar Swati Bapko	MSc-II chemistry	
5)	Vyalij Komal Gangadhar	MSc-II chemistry	
5)	Dighorkar Ritika Rajendra	MSc-II Math	
6)	Nikam Amita bhagvant	MSc-II Math.	
7	Bharsar Shriya Sadanand	MSC I Botany	
8)	Suryawanshi Nandini Prakash	TYBSC Botany	
9)	Sholar Saloni Devendra	TYBCS	
10)	Deore Nikita Jibhau	TY BCS	
11)	Ahire Jayashri Sunil	TY BCS	
12)	Dange Priyanka Dhaku	TY BCS	
13)	Ahire Priti Vijay	TY BSC statistics	
14)	Kale Gayatri Hiraman	T.Y. BSC statistics	
15)	Hyalij Aarti Gokul	fy. BCS	
16)	Khairnar pallavi Dilip	F.Y.BSC (CS)	
17)	Jadhav Anjali Ashok	MSC-I Botany	
18)	Gawali Kavita Laxman	MSC-I Botany	

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Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
	Mr. M.R. Kshirsagar	Eco	[signature]
	D J Deore	Comp. Sci	[signature]
	D. N. Sonawane	Economics	[signature]
	Dr. R. N. Nikam	Psychology	[signature]
	DR. R. V. TRIBHUVAN	ENGLISH	[signature]
	Dr J. T. Jadhav	Botany	Jadhav
	Dr. V. S Mistary	Commerce	[signature]
	Dr. U. K. Teke	Commerce	[signature]
	Dr V. D Suryawanshi	Hindi	[signature]
	Lega Pooja Sanwalaram	commerce	[signature]
	Kaurani Kashish sushil	COMMERCE	Kashish
	Gaikwad komal Dileep	psychology	Gaikwad
	Sahare Madhuri Jejiram	psychology	[signature]
	Rishabh Vijay Pardeshi	Psychology	[signature]
	Khedkar Isha Manoji	Psychology	[signature]
	Vaidya Bhagyashri	Psychology	[signature]
	Pachpole Pallavi Laxman	psychology	Shinde
	Dhamane Sujal Jitendra	Comp. sci	Sujal
	Wagh Dipak Mohadhau	Comp sci	D.M. Wagh
	~~Nikwade Satyam Jitendra~~	~~FY.BSc~~	[signature]

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon
Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
01	Saniya Kauser Shaikh Mushtaque	MAI: Politics	
02	Deore Rupali Sharad	T.Y BSc chem	
03	Sonawane Pooja Eknath	T.Y B.S.C(Chem)	
04	Bhamare Asmita Samadhan	Ty. BSc(Elec)	
05	Suryawanshi Vishakha shashikant	TY. BSC[Elec]	
06	Wagh Shruti Vijay	T.y. BSC[Bio]	
07	Jagtap Vaishnavi Madhavrao	T.Y.BSC[C.S]	
08	Nikam Dipika Dilip	TYBSc(cs)	
09	Bagad Pooja Dipak	MSC-I(Botany)	
10	Bhadane Minakshi Devidas	MSC-I(Botany)	
11	Kachave Vaishnavi Manohar	S.Y.B.Sc[C.S]	
12	Deshpande Anushka Manoj	SYBSc(CS)	
13	Nikam Gitanjali Bhatat	SYB Sc[CS]	
14.	Nikam Swapnali Bhagwan	M.A (Eng)	
15.	Nakiya Haidar Loomwala	S.Y. BBA	
16.	Komal Manoj Bardiya	S.Y. BBA	
17	Aamna Md Sajid	MA Polit	

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Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
1)	Dr R.S Kale	Zoology	25/9/24
2)	Dr. K.T. Patil	—	
3)	Mr. G.V. Suryawanshi	Chemistry	
4)	Waghchaure A.B.	Politics	
5)	Deepak Thakre	Geography	
6)	Ansari. S.I	Stats.	
7)	Mr. Dilip A. Jagtap	Economics	
8)	Dr S.R. Nahire	Chemistry	
9)	Dr. S.M. Chinchole	Maths	

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Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
1	S.P. Pagar (Asst. Prof.)	Comp. Science	
2	Mr. A.B. Bachhav (Asst prof.)	Comp Science	
3	Pawar Harshal sahebarao	comp science	
4	Bagul Rohit Prakash	comp science	
5	Mr. R.B. Pawar (Asst. Prof)	Economics	
6	Mr. Bhandarkar D.S. (Asst Prof)	Psychology	
7	Dr. S.P. Shewale	Psychology	
8	Mr. M.P. Thakare	politics	

Mahatma Gandhi Vidyamandir's
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Avishkar Research Project Competition 2024-2025
Attendance Sheet

Sr. No.	Name of the Teacher/Student	Department	Signature
1.	K.T. Pathyar	chemistry	
2.	Dr. Milind M. Ahire	English	
3	Mr. C. R. Yewale	Physics	
4.	Mr. R. A. Pawar	Maths	
5.	Dr. K. S. Ahire	Mathematics	
6	Dr. D. V. Ahire	Botany	
7	Prof. Y. D. Sonawane	Botany	
8)	Dr. A. K. Sonawane	Zoology	
9	Nilesh Nagare	library	
10	Dr. Amit D. Kasliwal	Comp. Sci	

Inaugurator - Dr. B.S. Yadav - CEO - MGV, Nashik

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon
Avishkar Research Project Competition 2024-2025
Attendance Sheet

28/09/2024

Sr. No.	Name of the Teacher/Student	Department	Signature
1	Dr. C. G. Dighavkar	Principal	
2	Dr. T. S. Savale	V.P.	
3	Dr. S. S. Pathade	ARC	
4	Dr. N. B. Shirsath	Chemistry	
5	Prof. Dr. S. D. Patil	Zoology	
6	Dr. D. G. JADHAV	BOTANY	
7	Dr. K. S. Kokane	IQAC	

Mahatma Gandhi Vidyamandir's

MSG Arts, Science and Commerce College, Malegaon

One Day Workshop on Skill Enhancement

Organized by: Internal Quality Assurance Cell in Collaboration with Arena Animation, Nashik

Date: 27/08/2024 **Time: 10.00 AM**

Attendance Sheet

Sr. No.	Name of the Participants	Department	Signature
	Rupesh Suresh Jadhav	FYBA	[signature]
	Samir Aappa Sonwane	FYBA	[signature]
	Hire Shubham Sanjay	FY BA	[signature]
	Jitendra Pandharinath Daitkar	T.Y. B.com	[signature]
	Vaishnav Khandu Jadhav	F.Y. B.A	V.K.Jadhav
	Vishal Yogesh Borse	F.Y. B.A	[signature]
	Dipak Ballu Sonawane	S.Y. B.A	[signature]
	Jadhav Sunil Rajendra	T.Y. B.com	[signature]
	Pawar Mayank Sanjay	SYBCS	[signature]
	Sonawane Harshal P.	SYBCS	[signature]
	Mankar Mayur Tryambak	S.Y. B.A	[signature]
	Ishwar Narayan Bhamare	S.Y. B.A.	[signature]
	Ahire Soni Mahesh	S.Y.BCS	S.M.Ahire
14	Shelar Dnyaneshwar Shany	S.Y.BCS	Shelar
15	Ahire Pramod Prabhakar	S.Y. BCS	[signature]
16	Kolape Vishal Kailas	SY BA	Kolape
	Vaishnav Arun Suryawanshi	S.Y. BA	[signature]
	Mayur Rajendra Ahire	SY BA	M.R.Ahire
	Om Ganeshsing Pardeshi	F.Y. B.com	om
	Tanoj Shantaram Hiray	F.Y. B.Com	Sanoj
	Salgar Pravin Bhagwan	T.Y. B.A.	[signature]
	Vilas Sanjiv Kurwande	F.Y. B.A.	Vilas K.
	Badake Tushar Shankar	T.Y. BA	[signature]
	Jadhav Yogesh Ramesh	S.Y. B.A	[signature]
	Sonawane Dipak Ballu	S.Y. B.A	[signature]

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon

One Day Workshop on Skill Enhancement

Organized by: Internal Quality Assurance Cell in Collaboration with Arena Animation, Nashik

Time: 10.00 AM

Date: 27/08/2024

Attendance Sheet

Sr. Nd.	Name of the Participants	Department	Signature
	Ganesh Sukkal Bagad	F.Y.B.A	
	Bhangare Rakesh Atmaram	F.Y.B.A.	
	Vishal Dipak Tatale	F.Y.B.A	
	Ravindra Vishan Suryawanshi	FYBA	
	Tayyab Vaibhav Manoj	S.Y.BSc	
	Rahul Ashok Ahire	FY BA	
	Yogesh Sarvan Kalmekar	FY BA	
	Raundal Pravin Ravindra	MA-II	
	Aher Rahul Baksaheb	T.Y.B.A	R.B. Aher
	Bachhav Vishal Ramesh	T.Y.B.A	
	Jadhav Sanket Sanjay	T.Y. B.com	
	Thake darshan sunil	T.Y.B.Com	
	Navale harshal Ravindra	T.Y bcom	Navale
	Hiray Vishal Bhausaheb	T.Y.BA	

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon

One Day Workshop on Skill Enhancement

Organized by: Internal Quality Assurance Cell in Collaboration with Arena Animation, Nashik

Date: 27/08/2024 **Time: 10.00 AM**

Attendance Sheet

Sr. No.	Name of the Participants	Department	Signature
25	Hirey Payal Devidas	SYBA	
26	Ahire Bhumika Sharad	SYBSc	
27	Manisha Dinesh More	F.Y.B.Com	
28	Kale Rupali Sudam	SYBSc	
29	Kote Priyanka Nandu	SY.BSC	
30	Hyalig Maunal Anil	SYBCS	
31	Kandekar Aastha shriram	SYBCS	
32	Deore Dipali Kishor	SY BCS	
33	Ahire Radhika Deepak	SYBCS	
34	Shelar Gauri Sushil	SY.BCS	
35	Jadhav Harshali Rajaram	SY BCS	
36)	Snehal Bhalu patil	F.y.B.com	
37)	Vrushali Bhausaheb Navle	F.Y.B.com	V.B.Navale
38)	Kale Manisha Manohar	S.Y.BSC	
39)	Desale Mansi Jitendra	T.Y.BSC	M.J.Desale
40)	Bhamare Asmita samadhan	T.Y.BSC	
41	Pooja Ganesh Ughade	SY B A	

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon

One Day Workshop on Skill Enhancement

Organized by: Internal Quality Assurance Cell in Collaboration with Arena Animation, Nashik

Date: 27/08/2024 **Time: 10.00 AM**

Attendance Sheet

Sr. No.	Name of the Participants	Department	Signature
1)	Gangurde Harshali Bhaskar	T.Y.BSc	
2)	Bhavsar Kiran Kailas	T.Y. B.com	K.K.Bhavsar
3)	Hiray Harshada Kailas	T.Y. B.Com	
4)	maurya Ankita lalji	TYBCom	Ankita
5)	Diska Dayal Jagtap	Sy. BA	Jagtap
6)	Rayate Mayuri Bapu	SY.BSC	MBR
7)	Shivarge Gauri kailas	F.YBSC	Gauri
8)	Kshitija Sanjay Hire	S.Y.BA	
9)	Chaitali Santosh Mahajan	SY. BA	
10)	Kalyani Laxman Jadhav	Sy.bSc	
11)	Dimpal Vishnu Gangurde	SY. BSc	Gangurde.
12)	Anuradha Hiralal Shirsath	FY.B.com	Shirsath
13)	Tanaya Atmaram Deore	FY BCom	T.A.Deore
14)	vaishnavi sadashiv shirsath	Fy B. com	Shirsath
15)	Pooja Nivrutti Chavan	F.Y. B. Com	P.N.chavan
16)	Lakita Mukesh Thorat	Fy B.com	Lakita
17)	Nikita gorakh Hyalij	SY B.Sc	
18)	Rupali Sunil Bhadane	SY. BSc.	
19)	kshirsagar Darshana Bhausaheb	Sy.BSC	kshirsagar
20)	shinde premal pradip	Sy. BSc	
21)	vahire Harshita Sanjay	Sy. BSc	
22)	shinde vedika Sanjeeva	Sy. BSc	
23)	shillak Dipali Baban	SYBA	Shillak
24)	Pawar Gayatri Datta	SYBA	

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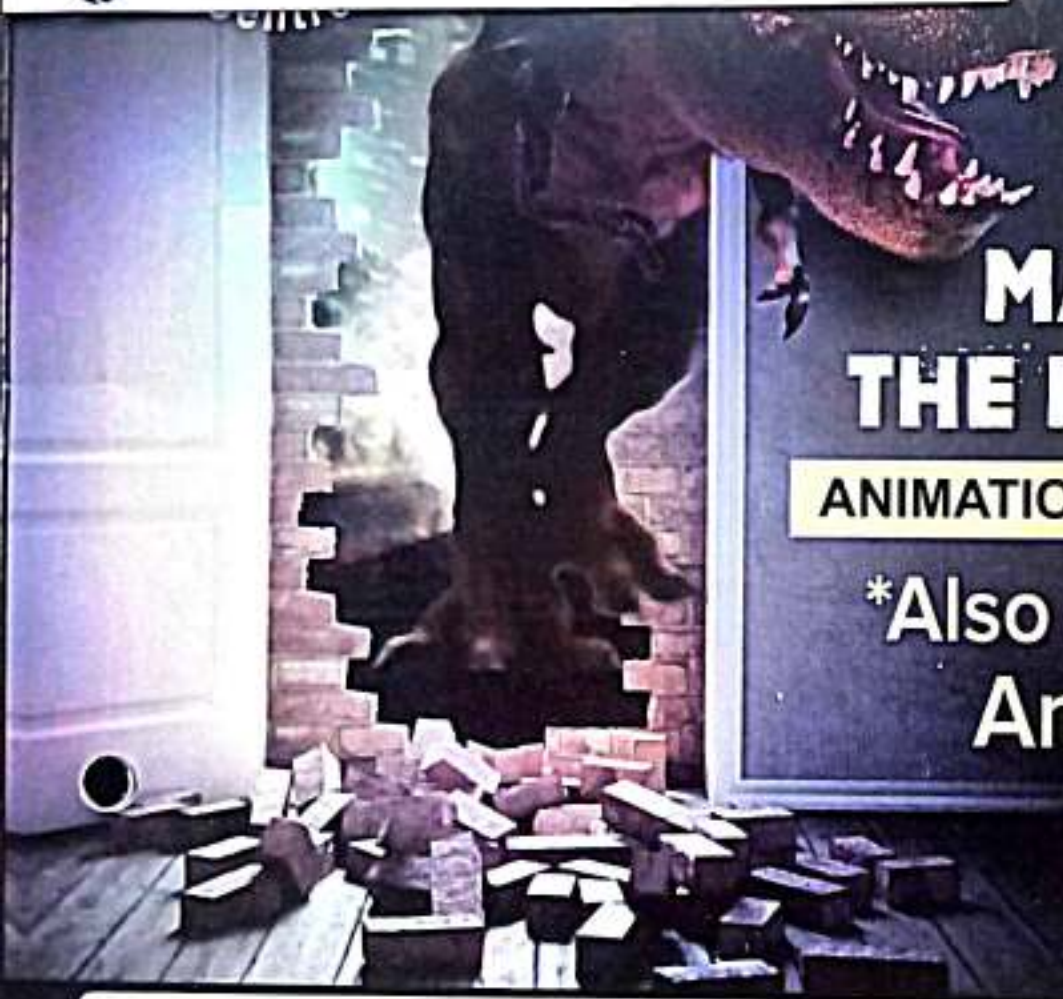

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- Sinner Centre- Arena Animation, Shop No. 15, Sai anand pride B, Opp. Reliance mall, Ghoti-Shirdi road, Sinner. — Call: 7219284895

Website: www.arenanashik.com facebook link: www.facebook.com/arenanasik/?ref=bookmark

Mahatma Gandhi Vidyamandir's
MSG Arts, Science and Commerce College, Malegaon

One Day Workshop on SWAYAM/NPTEL

Organized by: Internal Quality Assurance Cell

Date: 09/08/2024 **Time: 11.30 AM**

Attendance Sheet

Sr. No.	Name of the Faculty	Department	Signature
1)	Dr. C. G. Dighavkar	Principal	
2)	Dr T. S. Savale	V. P.	
3)	AJAY AHIR	History	
4)	Dr. V. D. Suryawanshi	Hindi	
5)	Nilesh Nagore	library	
6)	Dr. K. S. Thakare	physical	
7)	Dr. C. D. Rajput	Political sci	
8	Dr. Bharati Khairnar	English	
9	Dr. C. M. Nikam	Geography	
10)	Dr. R.S. Kale (Representative)	Zoology	
11)	Dr. B. M Sonawane	Economics	
12	Dr. K. S. Ahire	Mathematics	
13.	Dr. S C. Kulkarni	Electronic-Sci	
14.	Dr. A. G. Nerkar	Marathi	
15	Dr. R. N. Nikam	Psychology	
16)	Ansari S. I.	Stats.	
17)	Jadhav D. G	Botany	
18)	Dr. S. S. Patkade	ARC	
19)	D J. Deore	Comp. Sci.	
20)	R. V. Tribhuvan	English	
21)	Dr. P. S. Pawar	Chemistry	
22)	Waghchaure G N	N. S. S.	

गुरू फाउंडेशन, रोहतक

देवी अहिल्याबाई होलकर सम्मान 2024

प्रमाण पत्र संख्या : GF/DABHS/2024-029

डॉ. राजाराम गमना शेवाळे
महाराष्ट्र

शिक्षा एवं समाज सेवा

उपर्युक्त क्षेत्र में आपकी सेवाएं उल्लेखनीय एवं अद्वितीय हैं। आपके प्रेरक और रचनात्मक कार्यों से समाज को एक नई दिशा मिली है। आपकी लगन व निष्ठा के साथ सामाजिक कार्यों में अग्रिम सहभागिता एवं दक्षता सराहनीय है। आज 31 मई 2024 को एक अप्रितम, प्रबुद्ध और प्रतिभाशाली कर्मयोगी के रूप में आपको राष्ट्रीय स्तर पर सम्मानित करते हुए हमें असीम हर्ष और गौरव की अनुभूति हो रही है। हम आपके भावी जीवन में आपकी प्रगति, प्रतिष्ठा, समृद्धि, स्वस्थ और दीर्घायु जीवन हेतु ईश्वर से प्रार्थना करते हैं। समाज की धरोहर के रूप में आपको यह अलंकरण समर्पित करते हुए फाउंडेशन गौरवान्वित है।

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فہرست

قدرت غیر معمولی اور حیرت انگیز ہے اور جب اپنے طنزیہ کلام میں انگریزی الفاظ استعمال کرتے ہیں تو اس طرح کرتے ہیں جیسے زیور میں نگینے جڑ دیے گئے ہوں۔"

(مشاہیر ادبیات مشرقی، پروفیسر محسن عثمان ندوی،
قومی کونسل برائے فروغ اردو زبان، نئی دہلی، ۲۰۱۱ء، ص ۳۱)

اکبر نے اپنی شاعری سے وہ کام لیا ہے جو بڑے سے بڑے اخلاقی مضامین اور تقریروں سے نہیں لیے جاسکتے بحیثیت مصلح قوم، طنزیہ و مزاحیہ شاعری میں ان کا رتبہ بہت بلند ہے۔

❖❖❖

شعور و ادراک

نیا قلم نئی تحریریں

غزل کا فن اور ارتقاء

ڈاکٹر ساجد انصاری
صدر شعبہ اردو فارسی
ایم ایس جی آرٹس، سائنس اینڈ کامرس کالج، مالیگاؤں

رشید احمد صدیقی کے مطابق:

'غزل اردو شاعری کی آبرو ہے'۔(۱)

اگرچہ مختلف زمانوں میں شاعری کی بعض دوسری قسمیں بھی اردو میں بہت مقبول رہی ہیں لیکن نہ تو وہ غزل کی مقبولیت کا مقابلہ کرسکیں اور نہ ہی اس کی مقبولیت کو نقصان پہنچا سکیں حالانکہ بیسویں صدی کے نصف میں اس صنف کے بہت سے مخالفین پیدا ہوئے لیکن اس کی مقبولیت میں کوئی خاص فرق نہیں پڑا۔ اردو شاعری کا مطالعہ واضح کرتا ہے کہ غزل اردو شاعری کی مقبول ترین صنف "سخن" رہی ہے اور آج بھی غزل اردو شاعری پر راج کر رہی ہے۔ لفظ غزل کا ادبی مطلب محبوب سے گفتگو ہے۔ تاریخ کی رو سے یہ عربی لفظ غزل سے بنا ہے۔ جس کے معنی ہرن کے ہیں۔ غزل کے لغوی معنی ہیں، "عورتوں سے باتیں کرنا" یا "عورتوں کی باتیں کرنا"، غزل اس آواز کو بھی کہا جاتا ہے جو ہرن کے گلے سے اس وقت نکلتی ہے جب وہ شیر کے خوف سے بھاگ رہی ہوتی ہے۔ اس لیے چوں کہ اس میں واردات عشق کی مختلف کیفیات کا بیان ہوتا ہے، شاید یہ نام پڑا۔ اصطلاح شاعری میں غزل سے مراد وہ صنف شاعری ہے جس کا ہر ایک شعر الگ مضمون کا حامل ہو اور اس میں عشق و عاشقی کی باتیں بیان ہوئی ہوں خواہ وہ عشق حقیقی ہو یا عشق مجازی۔ لیکن آج کل غزل میں عشق و عاشقی کے علاوہ دنیا کا کوئی بھی موضوع زیر بحث لایا جاتا ہے۔ غزل کے لیے بحر و وزن کی پابندی لازمی حیثیت رکھتی ہے، ردیف اور قافیہ اس کے حسن میں اضافے کا سبب ہوتے ہیں۔ ردیف اور قافیے کے حوالے سے علامہ اخلاق حسین دہلوی لکھتے ہیں:

"ردیف کے بدلنے سے قافیے کی حیثیت بدل جاتی ہے اور ایک ہی قافیہ کئی طریق سے بندھا ہوسکتا ہے جس سے مضامین میں وسعت اور رنگینی پیدا ہوجاتی ہے۔ ردیف

جتنی خوشگوار اور اچھوتی ہوتی ہے اتنا ہی ترنم اور موسیقی میں اضافہ ہوتا ہے۔"(۲)

غزل میں ردیف کی اہمیت کے حوالے سے ڈاکٹر انور صابر کی کتاب 'پاکستان میں اردو غزل کا ارتقاء' کا یہ اقتباس ملاحظہ ہو۔۔۔۔

"غزل کے پاؤں میں ردیف جھانجھن کا حکم رکھتی ہے۔ یہ اس کو موسیقیت، ترنم اور موزونیت کو بڑھاتی ہے۔ دوسری طرف اس کے تنِ نازک کو گراں باری زنجیر کا احساس بھی دلاتی ہے۔ فنی لحاظ سے ردیف کی چولیں سب سے پہلے قافیے کو بٹھانی پڑتی ہیں۔"(۳)

غزل کا پہلا شعر مطلع کہلاتا ہے جس کے دونوں مصرعے ہم قافیہ اور ہم ردیف یا صرف ہم قافیہ ہوتے ہیں اور باقی اشعار میں صرف دوسرا مصرعہ قافیہ میں پہلے شعر کی پابندی کرتا ہے۔ آخری شعر میں شاعر اپنا تخلص استعمال کرتا ہے جس کی وجہ سے اس شعر کو مقطع کہا جاتا ہے۔ کلیم الدین احمد نے غزل کے حوالے سے اپنی کتاب میں لکھا ہے۔۔۔۔۔ "غزل ایک نیم وحشی صنفِ ادب ہے۔"(۴)

کلیم الدین احمد کے مذکورہ بالا خیال کی اہم وجہ غزل میں انتشارِ خیال کا ہونا ہے یعنی غزل کے اشعار میں موضوع کے حوالے سے کوئی ربط نہیں پایا جاتا اور ہر شعر کا موضوع اور مطلب الگ الگ ہوتے ہیں۔ غزل کی اردو ادب میں کامیابی اور پسندیدگی کی بنیادی وجہ یہ ہے کہ یہ ہر دور میں ہمارے ساتھ چلتی رہی ہے۔ اس نے ہر عہد میں ہمارے ادبی مزاج اور ہمارے انفرادی رویے اور اجتماعی حالات اور ہمارے تہذیبی رویوں کے ساتھ ہمارا ساتھ دیا ہے اور آہستہ آہستہ ہماری تہذیبی روایات، حالات اور بدلتے ہوئے مزاج کے باطن میں اپنی جگہ کو بنایا ہے۔ بہت سی اصناف مثلاً قصیدہ، مرثیہ اور مثنوی وغیرہ کو ہم لوگوں نے چھوڑ دیا لیکن غزل ابھی تک ہمارے ساتھ چل رہی ہے تو اس کی بنیادی وجہ صرف اور صرف یہی ہے کہ غزل نے ہر عہد اور ہر عصر میں نئے تقاضوں اور نئی فکر کو اپنے دامن میں جگہ دی ہے۔

اردو غزل کے ارتقاء کی چھان بین کرنے سے پہلے غزل کے ارتقاء کی چھان بین نہایت ضروری ہے غزل کی ابتدا فارسی زبان میں ہوئی، علامہ شبلی نعمانی کے خیال کے مطابق:

"یہ بار بار لکھا جا چکا ہے کہ ایران میں شاعری کی ابتدا قصیدہ سے ہوئی اور ابتداء میں غزل جو طبع سے نہیں، بلکہ اقسامِ شاعری کے پورا کرنے کی غرض سے وجود میں آئی۔ قصیدہ کی ابتداء میں عشقیہ شعر کہنے کا دستور تھا، اس حصے کو الگ کر لیا تو غزل

بن گئی، گویا قصیدہ کے درخت سے ایک قلم لے کر الگ لگا لیا۔"(۵)

مذکورہ بالا اقتباس کی روشنی میں ہم کہہ سکتے ہیں کہ اردو غزل کی ابتدا فارسی غزل کے زیرِ اثر ہوئی، لیکن ساتھ ہی خورشید الاسلام کا ذیل میں دیا گیا اقتباس بھی ملاحظہ فرمائیں:

"اردو غزل کی تاریخ کو میں اردو زبان کے باقاعدہ رواج پانے کی تاریخ سے قدیم تر سمجھتا ہوں۔ بظاہر یہ بات ناقابلِ فہم معلوم ہوتی ہے۔ کیوں کہ اردو زبان سے پہلے اردو غزل کا تصور کیسے کیا جا سکتا ہے لیکن یہاں غزل کے اس فکری و جذباتی سرمائے کی طرف اشارہ کرنا مقصود ہے جو زبان سے علیحدہ کر کے دیکھا جا سکتا ہے۔ رشید احمد صدیقی نے کسی جگہ غالب کی تعریف کرتے ہوئے لکھا ہے کہ انہوں نے اردو غزل کے نسب نامے کو ولی سے آگے بڑھا کر رودکی تک پہنچا دیا۔ غالب سے رودکی ایک ہزار سال کا فاصلہ ہے جو اچھے خاصے رشتوں کو دھندلا دینے کے لئے کافی ہوتا ہے۔ لیکن سولہویں صدی عیسوی کے آغاز تک یہ رشتہ ہمیں زیادہ واضح نظر آتا ہے۔ اس سے پہلے فارسی غزل زیادہ تر ایران کی چیز تھی اس میں سعدی و حافظ کی روشنی تو تھی لیکن صناعی و نازک خیالی کے وہ نکتات نہ تھے جو اسے ہندوستانی بنا کر اردو غزل کی پیش گوئی کرتے ہیں۔ سولہویں صدی میں کسی حد تک دبستان ہرات کے زیرِ اثر تازہ گوئی کی ایک انجمن قائم ہوئی جس کی قیادت فیضی و عرفی کرتے تھے۔ اسی کے تحت ان علایم و رموز اور مخصوص اسالیب بیان کو فروغ ہوا جنہوں نے اکبر سے شاہجہاں تک فارسی غزل میں ایہام، معاملہ بندی، شوخیِ بیان اور مبالغہ آرائی کو بڑھاوا دیا جو آگے چل کر اردو غزل کی بنیادی خصوصیات قرار پائیں۔"(۶)

مذکورہ بالا اقتباسات سے واضح ہوتا ہے کہ اردو غزل پر فارسی غزل کے بہت گہرے اثرات ہیں مگر اردو غزل نے فارسی غزل کی اندھی تقلید سے خود کو محفوظ رکھا ہے۔ اردو غزل نے فارسی غزل سے ہٹ کر اپنی الگ راہ بنائی ہے اور اسی بات کو پروفیسر آل احمد سرور نے کچھ یوں بیان کیا ہے:

"اردو غزل پر فارسی کا اثر بہت گہرا ہے مگر یہ فارسی کا چربہ نہیں۔ یہ ہندوستانی تہذیب کا ایک جلوۂ صد رنگ ہے۔ چنانچہ اس میں لوک گیتوں کی روایت، ہندوستان کے موسم، تیوہار، رسم و رواج، مجلسی اور تمدنی زندگی کے کتنے ہی نقوش محفوظ ہو گئے ہیں۔"(۷)

اردو غزل کے پہلے شاعر کے طور پر جس شخص کا نام آتا ہے اس کا نام امیر خسرو ہے۔ جدید تحقیق

کے علمبردار امیر خسرو کو ہی اردو اور اردو غزل کا پہلا شاعر قرار دیتے ہیں۔ امیر خسرو کے بعد اردو غزل ہمیں دکن میں نظر آتی ہے جہاں ہمیں سلطان محمد قلی قطب شاہ کا نام نمایاں طور پر دکھائی دیتا ہے۔ سلطان محمد قلی قطب شاہ اردو کے پہلے صاحب دیوان غزل گو شاعر ہیں لیکن جب بات باشعور غزل کی ہوتی ہے تو ہمیں ولی دکنی دکھائی دیتے ہیں، جنہوں نے اردو غزل کو بلندی عطا کی۔ اس دور کے دوسرے شعرا جنہوں نے ولی کی آمد کے بعد دہلی میں اردو غزل کو ترقی دی ان میں آبروؔ، نا جیؔ، یکرنگؔ، وغیرہ ہیں۔ اس کے بعد دہلی کی شاعری کے ابتدائی دور میں شاہ حاتمؔ نے زبان محاوروں اور الفاظ کی اصلاح کی طرف توجہ دی۔ آگے چل کر سوداؔ اور دردؔ، میرؔ نے اس صنف کی آبیاری کی۔ اس دور کی غزل میں زبان و بیان سادگی، صفائی اور لطف و اثر کی جو خوبیاں پائی جاتی ہیں اس کی مثال نہیں ملتی ہے۔ انیسویں صدی کے آغاز میں شاعری کا جو دور شروع ہوتا ہے وہ مختلف اعتبار سے اردو غزل کے لئے تبدیلی اور انقلاب کا دور ہے۔ اس دور کی غزل میں بلند اور رنگا رنگ مضامین، جزرک خیالات اور نیا انداز بیان پیدا ہوا۔ اس دور میں دہلی میں مومنؔ، غالبؔ اور ذوقؔ نے اس صنف کو ترقی دی جبکہ لکھنو میں وزیرؔ، جراتؔ، ناسخؔ، وغیرہ نے غزل میں اپنے انفرادی جلوے دکھائے۔ اس عہد کے بعد اقبالؔ، مجازؔ اور فیضؔ کا دور آتا ہے جنہوں نے اس صنف کی دنیا میں انقلابی تبدیلیاں پیدا کیں دور جدید میں غزل گو شعرا نے غزل کو خارجی آب و تاب سے نکالا اور داخلی حسن کی طرف توجہ دی۔ جدید دور میں غزل کو نہ صرف رومانی نشاط سے بھر دیا گیا بلکہ نئی اور دلچسپ تشبیہات و استعارات سے اس کے مرتبے کو بلند کر دیا گیا۔ حسرت موہانی، عزیز لکھنوی، فانی بدایونی، جگر مرادآبادی، اصغر گونڈوی اور فراق گورکھپوری نے سنجیدگی اور پاکیزگی، رومانیت اور حقیقت، لطافت اور نزاکت سے غزل کو اردو شاعری کی لافانی صنف بنا دیا اس کا نتیجہ یہ ہوا کہ آج غزل میں زندگی کے حقائق، فلسفہ کے نکات کے ساتھ ساتھ سیاسی معاملات اور وطن پرستی کے خیالات بھی پائے جاتے ہیں۔

حوالہ جات

(۱) جدید غزل، از۔ رشید احمد صدیقی، ص ۳
(۲) فن شاعری، علامہ اخلاق حسین دہلوی، ص ۱۵۰،
(۳) پاکستان میں اردو غزل کا ارتقا، ڈاکٹر انور صابر، ص ۱۵۸۔۱۵۹
(۴) اردو شاعری پر ایک نظر، از۔ کلیم الدین احمد ص ۵۷۔۵۸
(۵) شعر العجم، علامہ شبلی نعمانی، ج ۵، ص ۳۴
(۶) اردو ادب آزادی کے بعد از خورشید الاسلام، ص ۲۲
(۷) غزل کا فن، از آل احمد سرور

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شعور و ادراک

نیا قلم نئی تحریریں

اردو شاعرات کی چند منتخب نظموں کا تنقیدی مطالعہ

ڈاکٹر محمد امان اللہ

اسسٹنٹ پروفیسر، شعبہ اردو،

بی۔ آر۔ اے۔ بہار یونیورسیٹی، مظفر پور

اردو ادب میں سبھی اصناف سخن کی ترویج و اشاعت میں مرد حضرات نے جس طرح اپنی نمائندگی کرائی ہے ٹھیک اسی طرح خواتین کی خدمات کو بھی نظر انداز نہیں کیا جا سکتا ہے۔ خواہ فکشن ہو یا شعری اصناف۔ مختصر یہ کہ ہند و پاک کی تمام خواتین نے اردو کی نظمیہ شاعری کو فروغ دینے میں اپنے قلم کو فعال رکھا ہے۔ جب ہم اردو کی نظمیہ شاعری کی تاریخ پر نگاہ ڈالتے ہیں تب اس بات کا انکشاف ہوتا ہے کہ اردو نظم کو فروغ دینے والی شاعرات کی ایک جم غفیر موجود ہے۔ جن کا نام احترام کا حامل ہے۔ آپ تمام شاعرات نے اردو نظم کو تمام فنی عناصر کی بنیاد پر زندگی کا بہترین آئینہ بنایا ہے۔ یہی وجہ ہے کہ ان شاعرات کی نظم جس طرح انسانی زندگی کے شیڈس کو نمایاں کرتی ہیں وہیں اپنی تمام تر حسن و قبح کے حوالے سے بھی اضافے کی حیثیت رکھتی ہیں۔ اس سلسلے سے میں سب سے پہلے پروین شیر کی نظم 'بے بسی' کا تنقیدی جائزہ لینا چاہوں گا۔ مختصر یہ کہ پروین شیر کی نظمیں حالات حاضرہ کی نشیب و فراز سے ہمیں آگاہ کرتی ہیں۔ اس کے علاوہ انہوں نے ماں کی محبت کو بھی اپنی نظموں میں جگہ دی ہے۔ اندھیرے اجالے، سکوت، کہو بہار سے، تجربہ گاہ، بے بسی، اشرف المخلوقات، ماں اور میرے بچے ان کی تحریر کردہ بہترین نظمیں ہیں یہ تمام نظمیں پروین شیر کی مشاہداتی قوت کو عیاں کرتی ہیں۔ نظم بے بسی ملاحظہ کیجئے۔ جس کے ذریعہ شاعرہ کے تجربے کا بہ آسانی جائزہ لیا جا سکتا ہے:

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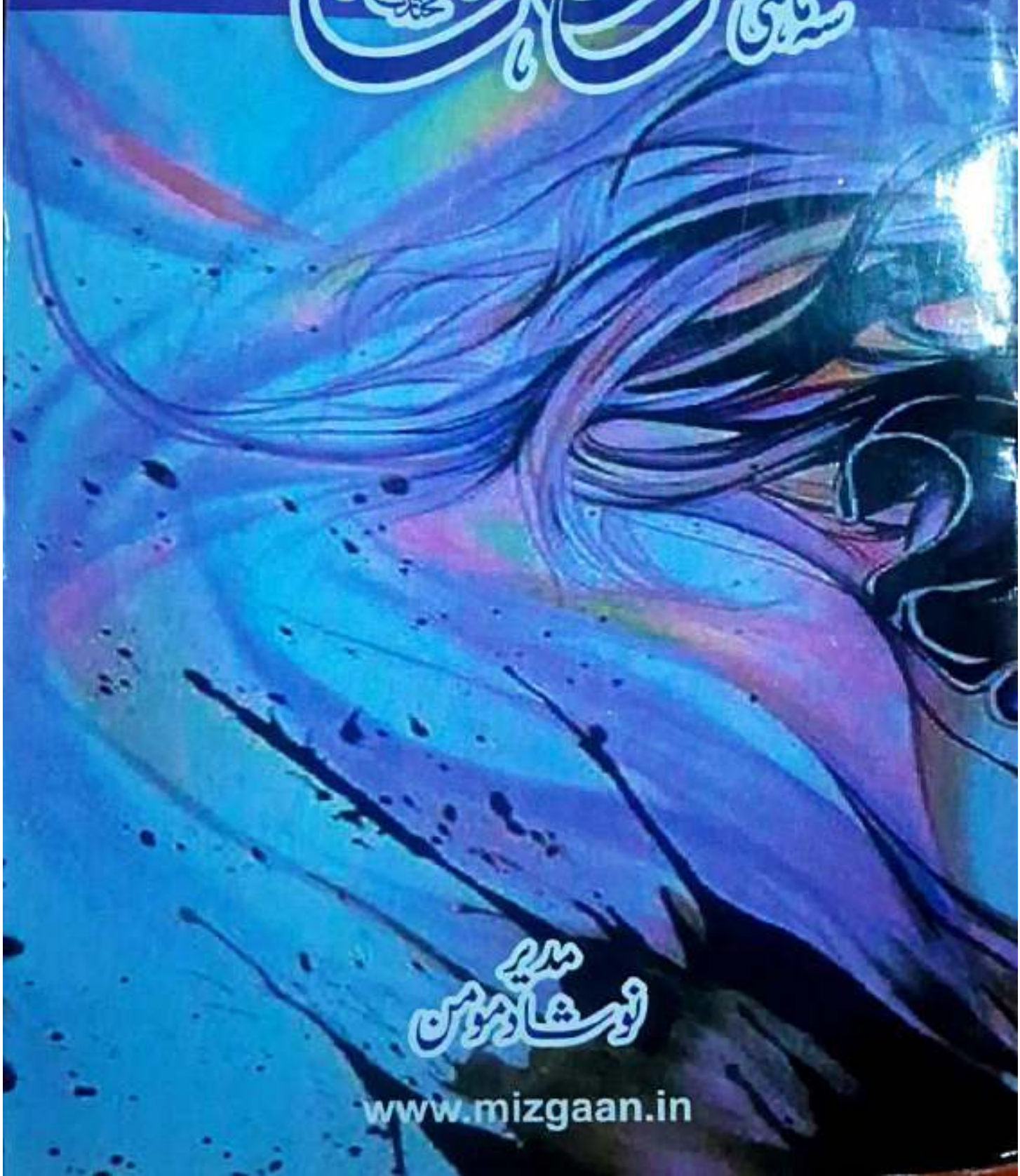

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فہرس

شعور و ادراک

نیا قلم نئی تحریریں

کرشن چندر کے افسانوں میں سماجی مسائل

ثمرین شفیق احمد

ریسرچ اسکالر،

دی ڈیکن مسلم ایجوکیشن اینڈ ریسرچ انٹی ٹیوٹ،

پونے (مہاراشٹرا)

کرشن چندر کا نام اردو ادب میں محتاج تعارف نہیں ہے۔ وہ اردو ادب کے سب سے بڑے افسانہ نگار ہی نہیں بلکہ ایشیاء کے اپنے زمانے کے سب سے عظیم افسانہ نگار گزرے ہیں۔ کرشن چندر بلاشبہ افسانے کی دنیا کے وہ جادوگر ہیں جو اردو ادب کے آسمان پر تقریباً آدھی صدی تک درخشاں ستارے کی طرح چمکتے رہے ہیں۔ ان کے افسانوں میں ایک مخصوص رومانی فضا قائم دکھائی دیتی ہے جو انھیں کا خاصہ ہے۔ یہ فضا ان کے افسانوں میں آخر تک قائم رہی حالانکہ آہستہ آہستہ وہ حقیقت پسندی کی جانب بھی مائل ہوئے۔ بہت سے اربابِ علم کے نزدیک وہ نثر میں شاعری کرتے تھے اور اگر ان کی کہانیوں کو 'نثری نظمیں' کہا جائے تو بے جا نہ ہوگا۔ بقول قرۃ العین حیدر ان کے یہاں 'Lyrical realism' ملتا ہے۔ ان کی شاعرانہ نثر کے بارے میں علی سردار جعفری رقم طراز ہیں:

> ''وہ بڑی بڑی محفلوں میں ہم سب ترقی پسندوں کو شرمندہ کر کے چلا جاتا ہے۔ وہ اپنے ایک ایک جملے اور فقرے پر غزل کے اشعار کی طرح داد لیتا ہے اور میں دل ہی دل میں خوش ہوتا ہوں کہ اچھا ہوا اس ظالم کو مصرعہ موزوں کرنے کا سلیقہ نہیں ہے ورنہ کسی شاعر کو پنپنے کا موقع نہ دیتا''۔ (۱)

کرشن چندر اپنے اسلوب اور کہانی کے بیانیہ کے حوالے سے اردو ادب میں اس قدر مقبول ہوئے کہ ان کے بعد کے افسانہ نگاروں نے ان کی تقلید کو اپنا معیار جانا اور ان کی کامیاب تقلید کرنے والے افسانہ نگار اپنے فن میں کامیاب رہے اور فنِ افسانہ میں اپنا انمٹ نقش چھوڑ گئے۔ خواجہ احمد عباس

اس حوالے سے رقم طراز ہیں:

"جب کوئی افسانہ لکھنے بیٹھتا تو یہ کوشش ہوتی کہ میرے افسانے میں بھی کرشن چندر جیسی جھلک آجائے۔" (۲)

خواجہ احمد عباس کی مذکورہ بالا عبارت سے کرشن چندر کے عہد کے افسانوی مزاج سے آگاہی ملتی ہے کہ کس طرح معیاری اور نامور افسانہ نگار کرشن چندر کی پیروی اور تقلید کو اپنے فن کا مقصد حیات بنائے ہوئے تھے اور کوشش کرتے تھے کہ ان کے افسانوں میں کرشن چندر کی جھلک آجائے اور ان کا افسانہ سند حاصل کرلے۔ حقائق کا مطالعہ کرنے والے محققین بھی اس نتیجے پر پہنچتے ہیں کہ کرشن چندر کے اسلوب کی تقلید ان کے فوراً بعد آنے والی پوری نسل نے کی جس کے لیے وہ میر کارواں ثابت ہوئے۔ اردو کے مشہور طنز و مزاح نگار کنہیالال کپور اپنی یادوں کو تازہ کرتے ہوئے بیان کرتے ہیں:

"۱۹۳۶ء میں پریم چند نے وفات پائی اور اسی سال کرشن چندر کی ادبی شہرت کا آغاز ہوا۔ دسمبر ۱۹۳۶ء میں 'ادبی دنیا' میں کرشن چندر کا افسانہ 'یرقان' شائع ہوا جس نے ادبی حلقوں میں تہلکہ مچادیا۔ مجھے یاد ہے جب میں نے یہ افسانہ پڑھا تو بے اختیار میرے منہ سے نکلا۔ بخدا، یہ افسانہ نہیں غزل ہے۔ یہ افسانہ رومانیت اور حقیقت کا ایک عجیب و غریب مرکب ہے۔ اور ایسی نثر میں لکھا گیا تھا، جس پر شاعری کا گمان ہوتا تھا۔" (۳)

کرشن چندر کی تعریف میں قرۃ العین حیدر کچھ یوں خوشہ چینی کرتی ہیں:

"کرشن چندر نے اپنی زندگی ہی میں ایک legend کی حیثیت اختیار کرلی تھی اور یہ ایک مختصر زندگی تھی ۔۔۔۔۔ ایسی شہرت اور مقبولیت بہت کم ادیبوں کو ملی۔ ایک زمانے میں نوعمر افسانہ نگار یہ تمنا کرتے تھے کہ کرشن چندر کی طرح لکھیں۔ اردو ادب نے بڑے فخر اور پیار سے کرشن چندر کو اپنے عہد کا نقیب اور ترجمان مانا۔ ان کی بے انتہا تعریف ہوئی اور بعد میں اتنی ہی کڑی تنقید۔ جس وقت کرشن چندر کی دھوم مچی میں اسکول میں پڑھ رہی تھی ۔۔۔۔۔ مجھے اب تک یاد ہے کہ کرشن چندر کی دو فرلانگ لمبی سڑک، زندگی کے موڑ پر، ان داتا، بالکنی وغیرہ ہمیں کس قدر دلآویز اور انوکھی معلوم ہوئی تھیں۔ ایک ہلکی پھلکی شعریت، حسن کاری، زندگی کا حساس اور پرخلوص مطالعہ۔ گویا لکھنے والے نے ایک طلسمی آئینہ ایسے

زاویے سے اُٹھالیا کہ اس میں ہماری آپ کی مانوس دنیا ایک مختلف رنگ میں نظر آنے لگی، جو بیک وقت اس کا حقیقی اور آئیڈیل روپ تھا۔ یہ نیا رویہ انسان دوستی اور اشتراکیت کہلا رہا تھا۔" (۴)

کرشن چندر کے افسانوں کا تحقیقی مطالعہ یہ واضح کرتا ہے کہ ان کے افسانوں میں نہ صرف رومانی عناصر ہیں بلکہ سیاسی و سماجی مسائل کا بے باکانہ بیان بھی ہے۔ کرشن چندر اپنے سیاسی نظریات کے حوالے سے بھی بڑے ثابت قدم رہے ہیں کو ان کے الفاظ میں ملاحظہ فرمائیں جو انہوں نے ۱۹۴۲ء میں ترقی پسند مصنفین کی کانگریس کے خطبۂ صدارت میں پیش کیا تھا:

"اب وقت آگیا ہے کہ ہر ادیب کھلم کھلا اشتراکیت کا پروپیگنڈہ شروع کردے۔ کیونکہ اب ہمارے سامنے دو ہی راستے ہیں، آگے بڑھتی ہوئی رواں دواں اشتراکیت یا ساکن و جامد موت۔"

کرشن چندر نے اردو افسانوی ادب کو جو ہمہ گیری، ہمہ جہتی، بلندی، وسعت، گہرائی اور گیرائی عطا کی ہے اس کی مثال ہماری ادبی تاریخ میں شاذ و نادر ہی ملے گی۔ وہ بڑے ادیب تو تھے ہی لیکن ایک عظیم انسان بھی تھے۔ پریم چند کے بعد ان سے بڑا فطرت شناس کوئی پیدا نہیں ہوا ہے۔ ان کی فطرت میں شرافت اور محبت کوٹ کوٹ کر بھری تھی۔ ان کا ذہن زرخیز اور مزاج میں بے حد انکساری تھی۔ ترقی پسند مصنفین میں جن افسانہ نگاروں کو بے پناہ مقبولیت اور شہرت حاصل ہوئی ان میں کرشن چندر کا نام سرفہرست ہے۔ کرشن چندر کی افسانہ نگاری میں پریم چند کی روایت کے اثرات اور راشد الخیری کے رجحانات نظر آتے ہیں۔ تاہم وہ راشد الخیری سے زیادہ متاثر دکھائی دیتے ہیں۔ ان کے افسانوں میں فطری مناظر اور حسن و جمال کا عنصر بہت نمایاں ہے۔ زندگی کی سچائیاں ان کے افسانوں کی مظہر ہیں اور انسانی رشتوں کی نزاکتیں ان کی تخلیقات میں حاوی نظر آتی ہیں۔ اگر ہم کرشن چندر کی افسانہ نگاری کا تنقیدی جائزہ لیں تو معلوم ہوتا ہے کہ وہ رومان پرور فضاؤں سے حقیقت کی سنگلاخ وادی میں داخل ہوئے اور مسائل و مصائب سے آلودہ فضا کو حسنِ فطرت اور انسان دوستی سے ہم آہنگ کرنے کی کوشش کرتے رہے۔

کرشن چندر کے افسانوں کا مطالعہ واضح کرتا ہے کہ کرشن چندر کے افسانوں میں سماجی مسائل جابجا بکھرے ہوئے ہیں ان کے افسانے سماجی مسائل کے حوالے سے سماجی ذہن پر چوٹ کرتے ہیں۔ "جہلم میں ناؤ پر" کرشن چندر کا ایک بہترین افسانہ ہے زبان و بیان کے اعتبار سے اس افسانے کا مقام بہت ہی بلند ہے لیکن اس افسانے میں بھی کرشن چندر نے سماجی مسائل کو جگہ دی ہے۔ غربت،

افلاس اور جہالت جیسے موضوعات کو اس افسانے کا مرکزی موضوع کرشن چندر نے بنایا ہے۔

''بالکونی'' بھی کرشن چندر کے ابتدائی افسانوں میں اہم حیثیت رکھتا ہے اور اس کی بھی تقریباً وہی حیثیت ہے جو جہلم میں ناؤ پر کی ہے اس افسانے کو کشمیر کی زمین کے حوالے سے کرشن چندر نے قلمبند کیا ہے اور اس میں یہ بتانے کی کوشش کی ہے کہ کس طرح ایک بے کس و مجبور آدمی حالتِ مجبوری میں جا بجا دست طلب دراز کرتا ہے۔ اپنی آبائی زمین، گھر بار چھوڑ کر بھوک اور پیاس کو مٹانے کی خاطر در بدر مارا مارا پھرتا ہے تا کہ کسی طرح وہ اپنے اہل و عیال کا پیٹ بھر سکے۔

فسادات دنیا بھر کے سماج کے لیے بہت بڑا مسئلہ ہیں انسانی جان و مال کے زیاں کے حوالے سے فسادات انسانی سماج کا وہ سر درد رہے ہیں جو آج تک دور نہ کیا جا سکا ہے کرشن چندر کا افسانہ ''لال باغ'' بمبئی کے فسادات سے متعلق ہے جس میں مذہبی ٹھیکے داروں اور لاشوں کے بیوپاریوں پر تیکھا اور بھرپور طنز کیا گیا ہے۔ اس حوالے سے کرشن چندر کے ''امرتسر'' اور ''پشاور ایکسپریس'' بھی قابلِ ذکر افسانے ہیں ان افسانوں کا کمال یہ ہے کہ ان کے مطالعے کے بعد قاری تقسیم ہند کے المیے کو اپنی نگاہوں کے سامنے محسوس کرتا ہے اور اس کے ذہن میں چنگاریاں سی بھرنے لگتی ہیں اور وہ بے قرار ہو جاتا ہے۔

کرشن چندر کی افسانوی کائنات میں ''زندگی کے موڑ پر'' ایک اہم مقام رکھتا ہے۔ یہ افسانہ پنجاب کی قصباتی زندگی کی دل کش اور متحیر کن تصویر پیش کرتا ہے۔ افسانے کا بنیادی موضوع انسانی بے بسی، محرومی اور تنہائی ہے۔ ان تمام موضوعات کا ذکر مذکورہ پچھلے افسانوں میں کسی نہ کسی زاویے سے ضرور ہوا ہے۔ اس افسانہ کے اہم کردار پرکاش چند اور پرکاش وتی ہیں۔ پرکاش چند سماج کے جابرانہ رویہ اور رسم و رواج کے خلاف احتجاج کرتا ہے حالانکہ اس کا یہ احتجاج ایک ایسے انسان کا احتجاج ہے جو نامساعد اقتصادی حالات کی وجہ سے ٹوٹ چکا ہے۔ پرکاش وتی صرف احتجاج ہی نہیں کرتی بلکہ بغاوت کا رخ بھی اختیار کرتی ہے۔ کرشن چندر اپنے افسانوی مجموعہ ''زندگی کے موڑ پر'' کے پیش لفظ میں مذکورہ افسانے کے بارے میں لکھتے ہیں:

> ''زندگی کے موڑ پر، میرا پہلا طویل مختصر افسانہ ہے اور شاید اب بھی مجھے یہ اپنے تمام افسانوں میں سب سے زیادہ پسند ہے۔ اس میں وسطی پنجاب کے ایک قصبہ کا مرقع پیش کیا گیا ہے۔ اور اس قصباتی پس منظر کو لے کر شادی، براہمنی نظامِ زندگی، عشق کی خودکشی اور ان سے متعلق مسائل سے پیدا ہونے والے فکری اور جذباتی ماحول کی آئینہ داری کی گئی ہے۔ جہاں تک ان مسائل سے پیدا ہونے والی فکری اور ذہنی الجھنوں کا تعلق ہے، آپ ان کی نفسیاتی تشریح کی واضح صورت اس کہانی میں

دیکھیں گے۔" (۵)

المختصر یہ کہ کرشن چندر کے افسانوں میں جابجا ہمیں سماجی مسائل کا بیان نظر آتا ہے ان کے افسانوں کا مطالعہ یہ بتاتا ہے کہ وہ پامال، پسماندہ اور محنت کش عوام کے حقوق کے پاسبان اور نگہبان تھے، وہ اپنے افسانوں کے ذریعے سماج کے پسماندہ اور معاشی طور پر کمزور افراد کی زندگی سدھارنے کی کوشش کرتے ہیں وہ اس زمین کو جنت کا ایسا حصہ بنانا چاہتے ہیں جہاں پر کسی کو بھی کوئی بھی قسم کا غم اور پریشانی نہیں ہے وہ اپنے افسانوں کے ذریعے سے سماجی مسائل کا حل چاہتے ہیں وہ ایک عام اور غریب انسان کے ہونٹوں پر مسکراہٹ لانا چاہتے ہیں ان کی تحریریں انسان دوستی کے حوالے سے کل بھی مشعل راہ تھیں اور آج بھی ان کی تحریروں سے انسان دوستی کی راہیں منور ہیں۔ امید ہے آنے والے زمانے میں بھی لوگ اس سے استفادہ کریں گے۔

حوالہ جات:

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(۵) کرشن چندر، 'زندگی کے موڑ پر'، ص ۲

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International Webinar on

Urdu Novel, Kal Aaj Aur Kal

Organized By : Qirtaas Wa Qalam

(Urdu Quarterly, Regd. by Govt. of India)

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By : Dr Md Khaleel Siddiqui

(M.A., M.Ed., B.J.M.S., Ph.D.)

ڈاکٹر خلیل صدیقی کی

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M.S.G. College, Malegaon

ناول میں حقیقت پسندی

ناول نثر کی وہ صنف ہے جس میں کسی علاقے کی تاریخی، تہذیبی، تمدنی، معاشرتی اور معاشی، سیاسی اور مذہبی حالات کی عکاسی صاف نظر آتی ہے۔ ناول میں انسان کی زندگی کے تمام تر پہلوؤں کی مکمل ترجمانی ممکن ہے۔ جس میں انسانی زندگی کے ماضی وحال کے ساتھ ساتھ اس کے تاریخی وتہذیبی پہلوؤں کو بھی اجاگر کرتا ہے۔ اور ان حالات کے پیش نظر ان کے حل اور امکانات سے بھی روشناس کراتا ہے۔ ڈیڑھ پونے دوسو سال پر محیط اردو ناول کی تاریخ کو اگر ہم عنوان کے اعتبار سے دیکھیں تو اردو ناول کی ابتداء کے اغراض ومقاصد جاننا ہمارے لئے ضروری ہوجاتا ہے۔ ۱۹ ویں صدی کے عہد میں جب ناول کی شروعات ہورہی تھی اس زمانے میں ہندوستان کے حالات پر نظر ڈالیں اور انسان کے ذہنی متحرکات کا جائزہ لیں تو ہمیں معلوم ہوتا ہے کہ لوگ طویل داستانوں سے اکتا گئے تھے۔ جھوٹ اور مبالغہ آرائی جیسی کہانیوں سے بیزار ہوچکے تھے۔ لوگوں کے دلوں پر مافوق الفطرت عناصر کے اثرات کم ہونے لگے تھے۔ لوگوں کا شعور بیدار ہورہا تھا۔ تعلیم عام ہورہی تھی۔ لوگ ذہنی تربیت پارہے تھے۔ لوگوں کے سوچنے سمجھنے کے انداز اور فکر میں تبدیلی واقع ہورہی تھی۔ جب لوگ بدلے تو ان سے منسلک سیاسی، سماجی، معاشی، معاشرتی، تہذیبی حالات میں بھی تبدیلیاں رونما ہونے لگیں۔ مجموعی طور پر ہم یہ کہہ سکتے ہیں کہ انسان خواب و خیال کی دنیا اور داستانوی اور مافوق الفطرت عناصر کو پیچھے چھوڑ کر حقیقی زندگی سے روشناس ہونا چاہتا تھا۔ اپنے اطراف و اکناف اور اپنے وجود کی حقیقت کو جاننے کیلئے بے چین تھا۔ ان حالات میں ناول کی حقیقت پسندی نے انسان کو اضطراب سے نکال کر حقیقی دنیا میں لا کھڑا کردیا۔ اور اس کے اضطراب کو وہ سکون عطا کیا۔ جس کا وہ متلاشی تھا۔

ای ایم فاسٹر کا قول ہے "ناول کی بنیاد اس کے قصے پن پر قائم ہے۔" (E.M. Forster, Aspects of Novel P. 117) اس سے واضح ہوتا ہے کہ مافوق الفطرت حالات وواقعات کی بہ نسبت موضوع کو زیادہ اہمیت حاصل ہے۔ بلکہ یہ کہنا غلط نہ ہوگا کہ اردو ناول کے قصے حقیقی زندگی سے اخذ کئے جاتے ہیں۔ اور یہی حقیقت نگاری، حقیقت پسندی ناول کا خمیر ہے۔

پیغام آفاقی اپنے ایک مقالے میں لکھتے ہیں کہ "لہٰذا ایک حقیقی ناول لکھنے کیلئے ناول نگار کا معاشرے کے تمام پہلوؤں کا گہرا علم ہونا ضروری ہے۔۔۔۔" مکمل طور پر حقیقت پسند ناولوں کے علاوہ کچھ ناولوں کے پڑھنے کو ہم اختیاری/ اضافی قرار دے سکتے ہیں۔ ان میں وہ ناول شامل ہوں گے جو پوری زندگی کے کل کی روشنی میں اپنے کرداروں اور واقعات کو نہیں دیکھتے لیکن زندگی کے کسی ایک اور جس پہلو پر روشنی ڈالتے ہیں وہاں وہ مقامی حقیقت کا گہرا تجزیہ کرتے ہیں۔" (فکر وتحقیق اپریل تا جون ۲۰۱۶ء۔ پختہ اور ناپختہ ناولوں میں فرق)

حقیقت پسندی کو سمجھنے کے بعد یہ واضح ہوتا ہے کہ عہد بہ عہد جیسے جیسے حالات وواقعات میں انسانی زندگیوں میں، سماج، معاشرت اور تہذیب میں تبدیلیاں واقع ہوتی گئیں۔ ویسے ویسے ناول کے موضوعات میں بھی ان صداقتوں کا بیان دکھائی دیتا ہے۔ ذیل میں ہم ابتدائی دور سے اکیسویں صدی تک کے لکھے گئے کچھ ناولوں کا جائزہ پیش کرتے ہوئے حقیقت پسندی کے رجحان کا مطالعہ کریں گے۔

ناول کی ابتداء ڈپٹی نذیر احمد کے ناول "مراۃ العروس" (۱۸۶۹) سے ہوا۔ سرسید اور نذیر احمد اس بات سے اتفاق کرتے تھے کہ ایک حقیقت پسندانہ ادب تخلیق کیا جائے۔ جو تصوراتی اور خیالی دنیا سے پرے ہو۔ ایسے میں اس ناول کے ذریعے نذیر احمد نے حقیقت نگاری پر قلم اٹھایا۔ اور اپنے ناول میں متوسط طبقے کے مرد وعورت کی اصلاح، تعلیم نسواں کے مسائل، امور خانہ داری، تربیت اولاد، جیسے معاشرتی موضوعات کی سچائی کو بیان کیا۔ رتن ناتھ سرشار کا شاہکار ناول "فسانہ آزاد" جس میں انہوں نے لکھنؤ کی تہذیب و معاشرت کے گوناگوں پہلوؤں کو بیان کیا ہے۔ محمد احسن فاروقی اس ناول کے بارے میں لکھتے ہیں "ناول سے سچا ذوق حاصل کرنے کیلئے اور سچے مذاق کی ناول لکھنے کیلئے پہلے سرشار کے پیر چھو لینا چاہئے۔"

25,26, NOVEMBER 2023, ONLINE 2 DAYS
INTERNATIONAL WEBINAR
"EAKKISSWEEN SADI AUR FIKR-E-IQBAL"
ORGANISED BY ORGANIZATION
FOR PROMOTION OF URDU CHENNAI
TAMIL NADU INDIA

تنظیم فروغ اردو، چنئی، ٹمل ناڈو، انڈیا کے زیر اہتمام
25,26 نومبر 2023 دوروزہ بین الاقوامی آنلائن ویبنار
بعنوان "اکیسویں صدی اور فکر اقبال"

Certificate

Dr.Shaheena Parwin Md.Ilyas Siddiqui Assistant Prof.M.S.G.Arts ,Science and Commerce College.Malegaon

This is to Certify that Mr/Mrs had participated and Presented a Paper/Chaired a session on the topic

Nasale Nao aur Allama Iqbal

in the two day's online international Webinar on "Eakkissween sadi Aur Fikr-e-Iqbal" Organised by Tanzeem Farogh-e-Urdu Chennai Tamilnadu India on 25,26 November 2023

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اکیسویں صدی اور فکرِ اقبال

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چیرمین شعبہ اردو مدراس یونی ورسٹی، چنئی، ٹملناڈو، انڈیا

مرتب

ڈاکٹر تمیم احمد. وی

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بسم اللہ الرحمٰن الرحیم

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اور
فکرِ اقبال

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اکیسویں صدی نئے لوگ، نئی نسل، نئے افکار اور نئی نئی ترجیحات کے ساتھ ہمارے سامنے موجود ہے۔ یہاں میں نئی نسل کی اصطلاح کو واضح کر دینا ضروری سمجھتی ہوں۔ آکسفورڈ ڈکشنری میں ایک نسل کا زمانہ 1/ 3 صدی یا ۳۰ سال کے قریب بتایا گیا ہے۔ جب بچے جوان ہو جاتے ہیں اور اپنی ذمہ داریوں کو سنبھالنے اور سمجھنے لگتے ہیں۔ یہی وہ زمانہ جب ۳۰ سے ۳۵ سال کی عمر تک انسان نئی نسل کا نمائندہ ہوتا ہے۔ نئی اور پرانی نسل کا یہ عمل تغیر پذیر ہے۔ ہمارا مستقبل حال میں اور حال ماضی میں تبدیل ہو رہا ہے۔ البتہ ہم صدی کی اس سرحد پر کھڑے ہیں جہاں ہم نے بیسویں صدی کا غروب بھی دیکھا اور اس کو خیرباد کہا۔ ساتھ ہی اکیسویں صدی کا طلوع بھی دیکھا اور اور اس کا خیر مقدم بھی کیا۔

نئی نسلیں ہر قوم کا مستقبل ہوتی ہیں۔ یہی نوجوان نسل قوم کیلئے قیمتی اثاثہ ہوتے ہیں۔ صدی کے تقاضے اور افکار و ترجیحات کی بناء پر نوجوان نسل اپنے ردعمل کو ظاہر کرتی ہے۔ پرانی نسلوں کے جذباتی وفکری رویئے نئی نسل کے مقابلے مختلف ہوتے ہیں۔ نئی نسل کے افراد میں فکر کی کمی اور جذبے کی فراوانی ہوتی ہے۔ یوں سمجھ لیجئے کہ پرانی نسل اگر عقل مند

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ادب اور زندگی کا لازم و ملزوم کا رشتہ ہے۔ انسانی زندگی، ایک سماج سے وابستہ ہوتی ہے۔ انسان کی زندگی سماج اور معاشرے میں گہرا ربط ہوتا ہے اور یہ معاشرہ مسلسل متغیر ہوتا ہے۔ اس کے متغیر ہونے سے ادب کو نئے نئے موضوعات ملتے ہیں اور یہی مسائل و حالات ادب کا وسیلہ ہوتے ہیں۔ جیسے جیسے وسائل اور مسائل میں تبدیلیاں آتی ہیں ویسے ویسے ادب تبدیل ہوتا ہے ساتھ ہی ادب کی دیگر اصناف میں بھی تبدیلیاں رونما ہوتی ہیں۔ جہاں تک غزل کا تعلق ہے غزل اردو ادب کی پسندیدہ اور مقبول ترین صنف سخن ہے۔ ہر دور اور ہر عہد میں غزل ہر خاص و عام کی دلدادہ رہی ہے۔ دور قدیم میں اس کی آبیاری سے لے کر اب تک یعنی اکیسویں صدی جیسے ترقی یافتہ سائنسی دور میں بھی اپنی پوری شان کے ساتھ خاص سے عام تک رسائی حاصل کر چکی ہے۔ اس کی اصل وجہ یہ ہے کہ اس کے ایک شعر کے دو مصروں میں کائنات کو سمو لینے کی صلاحیت موجود ہے۔ اب جب کہ بیسویں صدی اپنے تمام تر حوادثات تغیرات، ہنگامہ آرائیوں اور جلوہ سامانیوں کے ساتھ رخصت ہو چکی ہے۔ اردو ادب ایک نئے عزم اور امید کے ساتھ اکیسویں صدی میں داخل ہو چکا ہے۔ اردو شاعری میں غزل کا یہ حال ہے کہ ناقدین اور مخالفین کے الزامات اور اعتراضات نے غزل میں مزید نکھار اور وسعت پیدا کر دیا ہے۔ ناقدین کی تنقید کے باوجود غزل کی شہرت اور عظمت میں ذرہ برابر بھی کمی واقع نہیں ہوئی۔ ہر عہد میں غزل، دیگر اصناف کے دوش بدوش اپنی پوری آب و تاب کے ساتھ آگے بڑھ رہی ہے۔ افتخار امام صدیقی ادبی فیچر میں لکھتے ہیں کہ

> ''اکیسویں صدی کا ادبی منظر نامہ کچھ اور ہوا چاہتا ہے ادمی کا سارا وقت ٹی وی کمپیوٹر انٹرنیٹ وغیرہ نے لے لیا ہے ناول کون پڑھے گا۔ کم از کم بڑے شہروں کا تو یہی حال ہے غزل نے قصیدے کے بطن سے جنم لیا تھا اور اب غزل کے بدن سے کئی ایک صنفی بیتی تجربے جنم لے رہے ہیں غزل اپنے آپ میں ایک نہایت ہی طاقتور اور ذہین صنف سخن ہے کہ اسے کتنا ہی توڑ مروڑ دیا جائے غزل غزل ہی رہے گی۔'' رسالہ شاعر۔ فروری 2001، صفحہ 7

اکیسویں صدی میں قدم رکھتے ہی غزلیہ شاعری کو کئی حوادثات اور چیلنجز کا سامنا کرنا پڑا۔ ان حادثات کا انسانی زندگیوں پر اتنا گہرا اثر ہوا کہ ان اثرات سے سماجی، ثقافتی، معاشرتی اعتبار سے جو تبدیلیاں رونما ہوئیں ان سے انسانی افکار و خیالات بھی تبدیل ہو گئے۔ اس مشینی اور جدید ٹیکنالوجی کے دور نے لوگوں کی زندگی اور خیالات کو یکسر بدل کر رکھ دیا۔ قدیم روایتوں کی جگہ جدت طرازی نے لے لی۔ گزرتے دنوں کے ساتھ ہر چیز پرانی ہو گئی لیکن صنف غزل ایک ایسی صنف ہے جس نے بدلتے ہوئے ماحول اور سماج کے تقاضوں کو پورا کرنے کے لیے اپنے اندر نئی جہتیں، نیا طرز، ایک نیا احساس اور انداز بیان اپناتے ہوئے جدیدیت کی راہ پر گامزن ہو گئی۔ اس گلوبلائزیشن کے دور میں انسانوں کو بہت سارے مسائل درپیش آئے ان میں سب سے بڑا مسئلہ انسانی تحفظ کا ہے جو عالمی بھیڑ میں بھی اپنے

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Volume - 2

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Agronomical Study of Pomegranate Profile in Nashik District (M.S.)

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Dr. Avhad Baban Arjun

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Irrigation and Agricultural Development in Nashik District

About the Author

Dr. Avhad Baban Arjun is an accomplished author and academician with a profound passion for Geography. As an Assistant Professor in Geography, he has dedicated a significant portion of his life to teaching and research, accumulating 16 years of undergraduate and 13 years of postgraduate teaching experiences. His journey in the field of geography began with a strong educational foundation, having graduated from SBS College in Karad, a renowned institution in India. Dr. Avhad Baban Arjun furthered his academic pursuits by pursuing postgraduate studies at Shivaji University in Kolhapur, where he developed deeper interest in Geography. His commitment to academic excellence was reaffirmed by his successful qualification for the prestigious UGC-NET (University Grants Commission - National Eligibility Test), a significant achievement that attests to his knowledge and expertise in the subject.However, Dr. Avhad Baban Arjun's academic journey did not stop there. His insatiable thirst for knowledge and research led him to complete a Ph.D. at SRTUM (Swami Ramanand Teerth Marathwada University) in Nanded, further solidifying his expertise in Geography. His doctoral research has likely contributed valuable insights to the field and enriched the academic landscape.

Content

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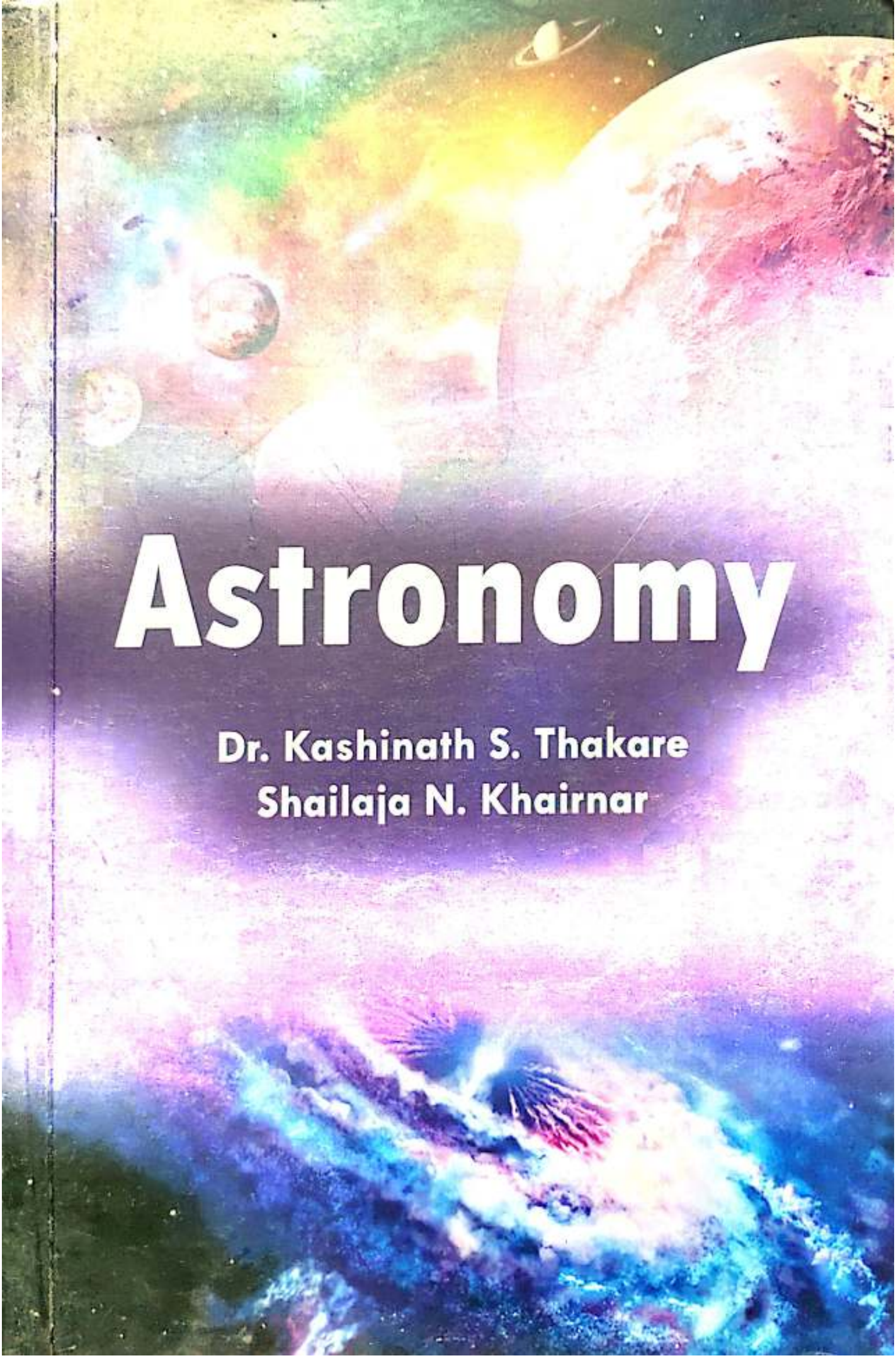

Astronomy is a vast topic beyond the limits of any skies. In this book, an attempt is made to put the subject for the beginners with ascending level of details towards the amateur sky gazers, both for naked eyed to those having telescopes. The book is intended for those studying Astronomy and Astrophysics at Undergraduate and Post graduate level to some extent. It covers most of the topics in these syllabi, astronomy in particular, at basic level. First chapter contains the necessary basic information of planets, stars, star clusters, galaxies etc. and celestial observations. The details of the constellations are given in second chapter with their maps, myths in short, prominent stars therein, deep objects, their peculiarities etc. This is the beginning. The readers suggestions will help in developing the book in future.

Dr. Kashinath S. Thakare, Associate Professor in Physics, M. S. G. Arts, Science & Commerce College, Malegaon-Camp, Dist.-Nashik He has been teaching Physics at under graduate for last 32 years and for a few years at post graduate level. Participated and presented research papers at various International, National, State and Regional level Seminars, Workshops and Conferences. Active participation in Organization of International, National level Conferences. Participation in various Academic Committees of the College and Mahatma Gandhi Vidyamandir, Nashik.

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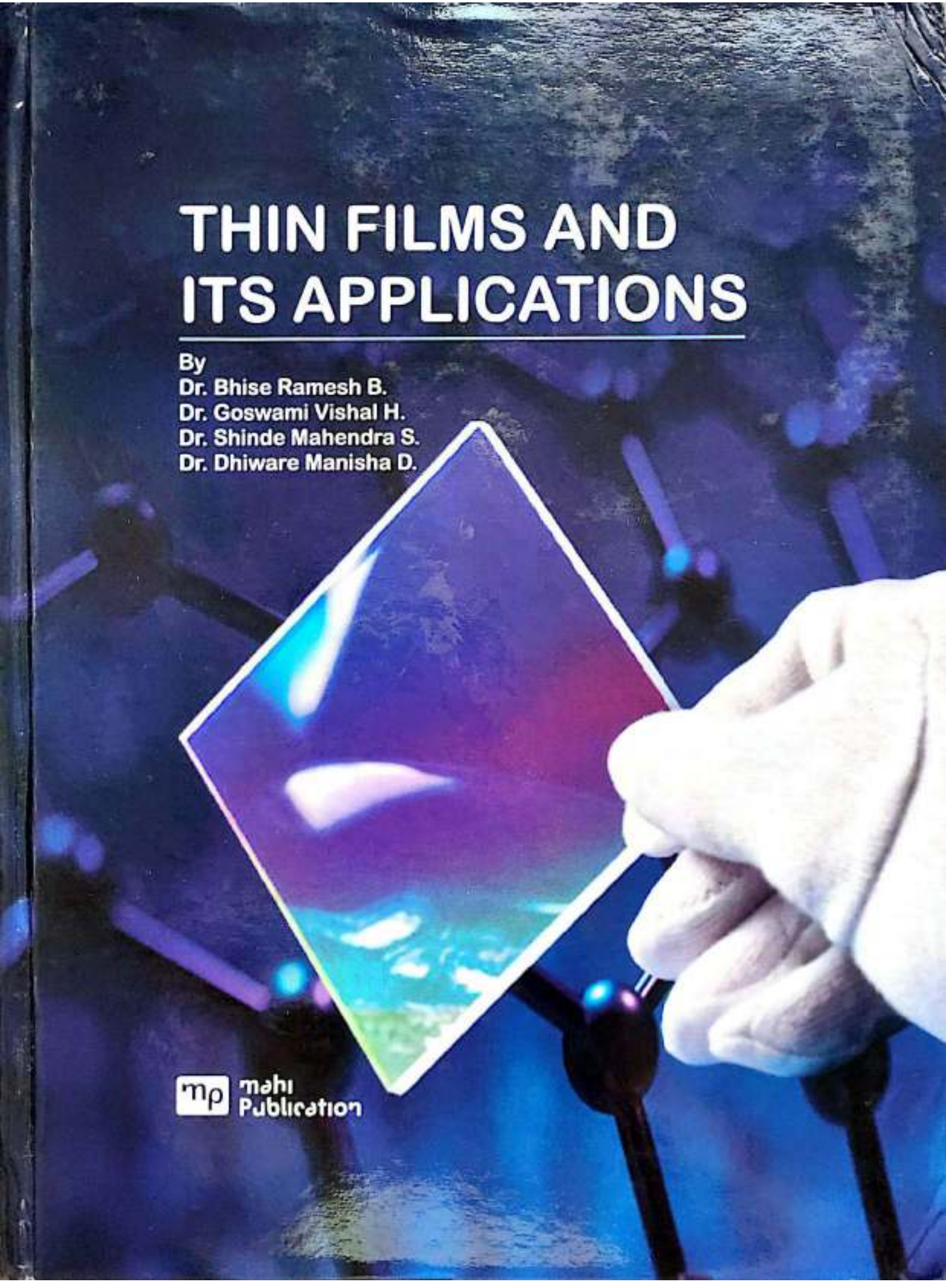

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In automation, to increase the efficiency and capability of the instruments in measurement and detection technology, to reduce the cost, shape, size, weight etc., it is necessary to introduce the sensor units at the input ports of domestic, industrial and scientific instruments. Gases having some odour can be perceived by smell, but odourless and hazardous gases can be hardly detected. Semiconductor gas sensors are the best choice on these backgrounds to detect odorless and hazardous gases. Semiconductors are used as gas sensors based on the principle of the variability of electrical conductivity of metal oxides when exposed to these gases. Since 1962, Tin oxide semiconductor gas sensors have undergone extensive research and development in this regard. It is the dominant choice for solid state gas detectors in domestic, commercial and industrial applications due to the low operating temperatures, high sensitivities, mechanical simplicity of sensor design and low manufacturing costs. Contamination free Thin Films samples can be prepared using Physical Vapour Deposition under high vacuum and at room temperature. Such Thin Film samples annealed suitably can be used as gas sensors.

Author has been working as an Associate Professor in Physics since last 32 years at MSG College, Malegaon, District Nashik (MS), India teaching at UG and PG level. Apart from Physics, he is interested in Astronomy as an Amateur.

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Kashinath Thakare

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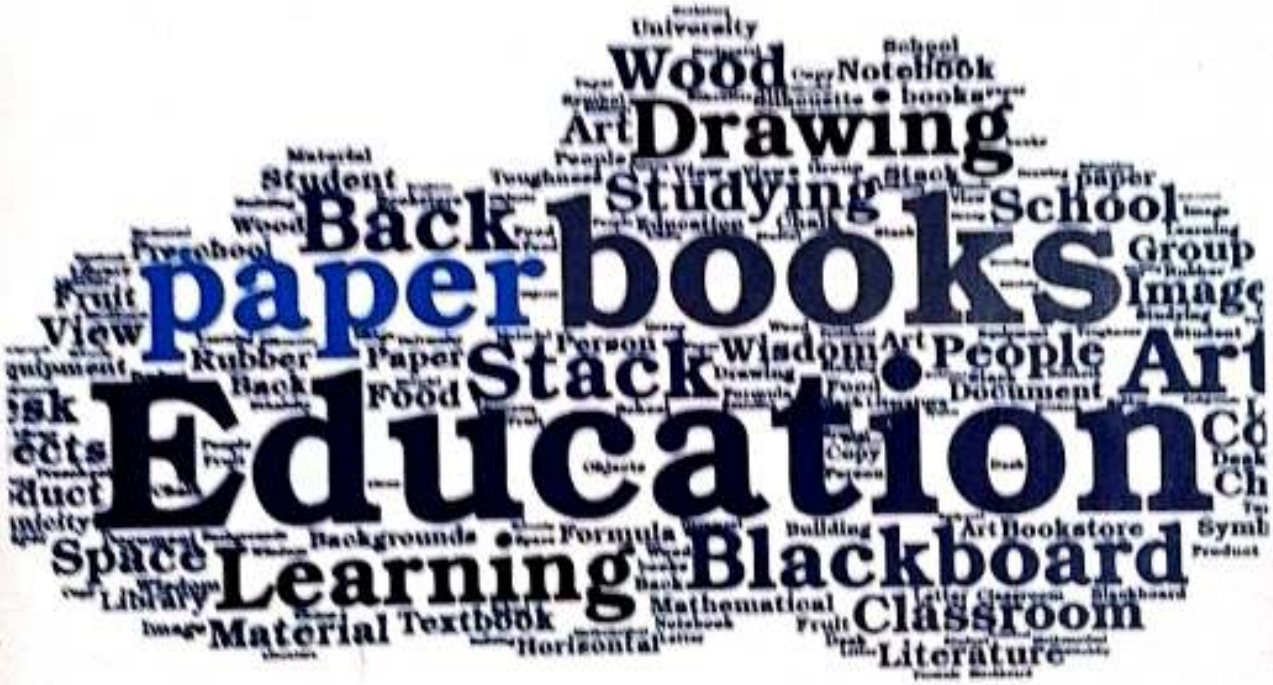

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E-Souvenir

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Latest Advances, Contributions and Applications in Non-Linear Analysis (LACANA)

(13th - 16th March 2024)

Centenary Celebrations of Prof V. Lakshmikantham

(16th March 1923 - 16th March 2024)

Organized by

G V P Prof. V. lakshmikantham Institute for Advanced Studies

&

Gayatri Vidya Parishad College of Engineering (Autonomous)

In Association with

International Federation of Nonlinear Analysts

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- GVP College of Degree and PG Courses
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- Gayatri Vidya Parishad - Institute of Health Care and Medical Technology
- Gayatri Vidya Parishad - MLBT School
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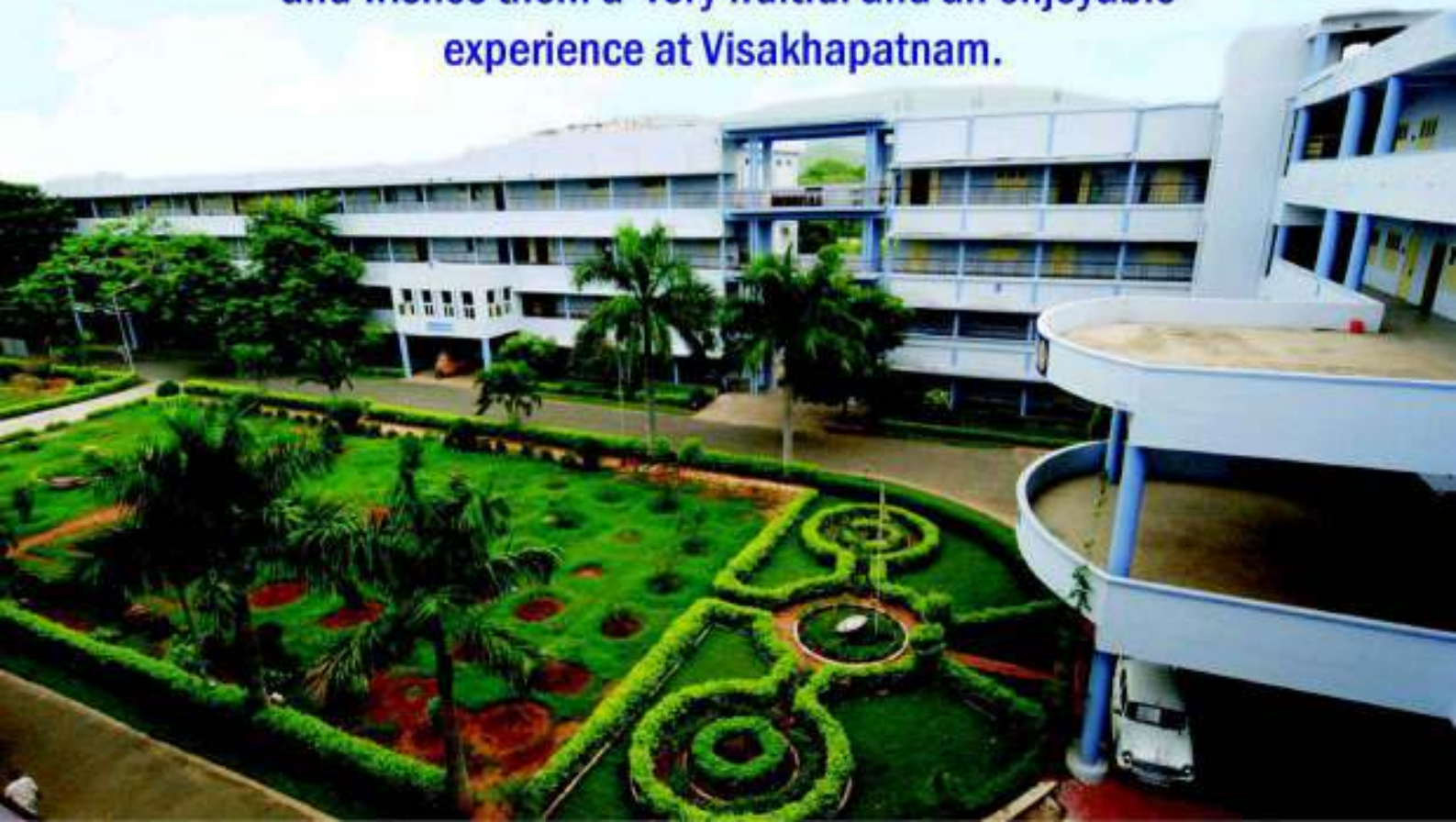
Welcome all the Delegates of the
International conference LACANA
and wishes them a very fruitful and an enjoyable
experience at Visakhapatnam.



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"In all those transactions which relate to wordly, Vedic or other affairs mathematics is employed. In the science of love in economics, in music and in dharma, in the art of cooking and similarly in medicine and in things like knowledge of architecture, the science of computation is held in high esteem . whatever is there in all the three worlds, which are possessed of moving and non-moving beings, all that indeed cannot exist without mathematics".

-Madhava of Sangamagrama (1340-1425 A.D.)

Message

I am very happy to note that as a part of Centenary Year celebrations of Prof. V. Lakshmikantham (16-03-2023 to 16-03-2024) Gayatri Vidya Parishad-Prof.V.Lakshmikantham Institute for Advanced Studies and Gayatri Vidya Parishad College of Engineering are organizing an INTERNATIONAL CONFERENCE on LATEST ADVANCES, CONTRIBUTIONS & APPLICATIONS IN NONLINEAR ANALYSIS (LACANA) from 13th to 16th March 2024. The LACANA conference is inviting delegates from different disciplines to lend a multi – disciplinary approach as envisaged by Prof. V. Lakshmikantham.

The First International Conference on "Recent Advances in Mathematical Sciences and Applications (RAMSA-09)" was held in the gracious presence of Prof. V. Lakshmikantham, when the team had the privilege of his direct guidance. After the RAMSA conferences conducted in 2013, 2017 and 2021, this LACANA conference is the 5th international conference in this direction and hope it will be a befitting tribute to Prof. V. Lakshmikantham as the focus is on multi-disciplinary mode in his centenary celebrations.

The LACANA Conference presents a unique opportunity to explore the limitless possibilities of mathematics and its transformative potential in shaping the future of our fields. I wish that the dynamic program of keynote speeches, panel discussions, and interactive sessions cultivate meaningful connections that will drive progress and innovation in our respective domains.

My compliments to the Organizing Committee under the chairmanship of Prof. A. B. Koteswara Rao and the Organising Secretaries Dr. J. Vasundhara Devi and Dr. RVG Ravi Kumar who with their team members have put in enormous efforts to organise the conference.

I wish the Conference all success.

Prof. Dr. Ing. P S Rao, FNAE

President,
Gayatri Vidya Parishad

Message

It is a matter of great delight that Gayatri Vidya Parishad - Prof. V. Lakshmikantham Institute for Advanced Studies and Gayatri Vidya Parishad College of Engineering propose to organize an INTERNATIONAL CONFERENCE on LATEST ADVANCES, CONTRIBUTIONS & APPLICATIONS IN NONLINEAR ANALYSIS (LACANA) as part of the centenary celebrations in honor of Prof. V. Lakshmikantham. This Conference is poised to offer a befitting tribute to the remarkable legacy of Prof. V. Lakshmikantham, whose contributions to the field of mathematics and engineering have left an indelible mark on generations of scholars and practitioners.

At the heart of every technological advancement lies a deep understanding of mathematical principles. I consider it a privilege to have sessions that explore the intricate connections between mathematics, engineering, and the broader scientific landscape. I foresee the conference providing a platform for showcasing the diverse applications of mathematics in solving real-world problems, driving innovation, and pushing the boundaries of human knowledge.

I encourage all the participants to make the best use of this opportunity to get engaged with the leading experts, share their knowledge and experiences, and contribute to the success of the conference. Together, let us celebrate the power of collaboration, innovation, and lifelong learning.

On behalf of GVP, I extend my sincere thanks to the organizing committee, volunteers, sponsors, and participants for their tireless efforts in making the LACANA Conference a reality.

I wish the conference a resounding success.

Prof.P. Somaraju
Secretary,
Gayatri Vidya Parishad

Message

It is with great pleasure and anticipation that I extend my heartfelt greetings for the forthcoming LACANA Conference, being organized by Gayatri Vidya Parishad-Prof.V.Lakshmikantham Institute for Advanced Studiesand Gayatri Vidya Parishad College of Engineering, as an integral part of the centenary celebrations in honor of the legendary Prof. V. Lakshmikantham.

The LACANA Conference promises to be a platform where scholars, researchers, and practitioners from diverse disciplines converge to explore and discuss the latest advancements, challenges, and opportunities in the areas of mathematics, engineering, and applied sciences.

I am sure this conference will nourish further the research aptitude among the delegates. Mathematics, being the common thread holding the pearls of all engineering disciplines, the various sessions will highlight the pivotal role of mathematics in shaping modern innovation and discovery.

I heartily thank all the Speakers, experts and enthusiasts participating in this conference from across disciplines and hope that the deliberations will foster a vibrant exchange of ideas, insights, and best practices that will inspire new collaborations and catalyze future advancements in mathematics and its various applications.

I wish the conference a great success.

Dr. A. B. Koteswara Rao
PRINCIPAL
Gayatri Vidya Parishad College of Engineering (A)

Message

It is with immense gratitude and a profound sense of honor that I, as an organizing Secretary, am part of this prestigious conference being held as a tribute to the illustrious Professor V. Lakshmikantham in his ongoing centenary celebrations.

The Gayatri Vidya Parishad-Prof. V. Lakshmikantham Institute for Advanced Studies stands as a testament to Professor V. Lakshmikantham's vision, passion for knowledge, and generosity towards fostering learning. Though he may not have witnessed his dream of establishing a private University in India come to fruition, his efforts resulted in the establishment of an institution dedicated to advancing knowledge and research in the field of mathematics.

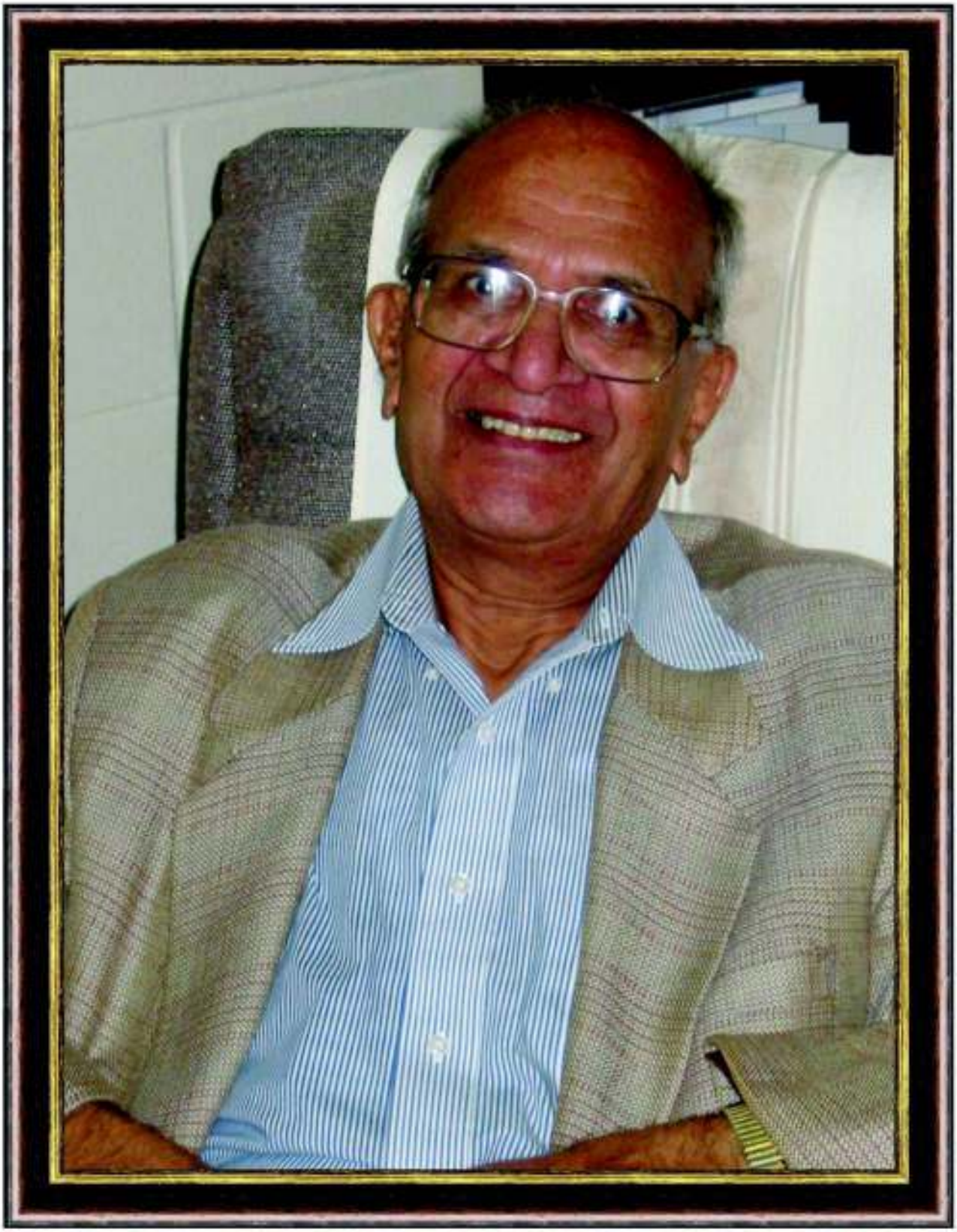
As we commemorate the centenary year of Professor V. Lakshmikantham, we have embarked on a journey of celebration, learning, and academic enrichment. From the inaugural function graced by esteemed dignitaries to a series of workshops, lectures, each event has been a tribute to his legacy and a testament to his enduring impact on academia.

The upcoming International Conference, scheduled from the 13th to the 16th of March 2024, serves as the grand finale of our year-long celebrations. This conference will be a gathering of enlightened minds from across India, featuring plenary speakers, keynote speakers, and participants from various esteemed institutions.

In conclusion, I extend my heartfelt gratitude to all those who have contributed - either directly or indirectly – in making these centenary celebrations a resounding success. Let us come together to honor Professor V. Lakshmikantham's legacy and to inspire future generations to continue his pursuit of knowledge and excellence.

Thank you.

Dr. J. Vasundhara Devi
Associate Director
GVP-Prof. V. Lakshmikantham Institute for Advanced Studies
&
Organising Secretary,
LACANA Conference.



A Tribute to (Late) Prof. V. Lakshmikantham

International Conference on Latest Advances, Contributions and Applications in Non-Linear Analysis (LACANA) & Centenary Birthday Celebrations of Prof V. Lakshmikantham

(13th - 16th March 2024)

Gayatri Vidya Parishad
Prof. V. lakshmikantham Institute for Advanced Studies
&
Gayatri Vidya Parishad College of Engineering (Autonomous)

Cordially invite you to the Inaugural function on 13th March 2024 (Wednesday)

Dr. Abraham Varughese

OS & Director - Naval Science & Technological Laboratory, Visakhaptnam has kindly consented to be the Chief Guest

&

Dr. V. Adimurthy

Former AD & ISRO Honorary Distinguished Professor
Vikram Sarabhai Space Centre
consented to be the Guest of Honour

Prof. Dr. Ing. P.S. Rao

President, Gayatri Vidya Parishad
will address the gathering

Time : 10.00 AM
Venue : Main Auditorium
Gayatri Vidya Parishad College of Engineering (Autonomous)
Madhurawada, Visakhapatnam.

Dr. J. Vasundhara Devi
Dr. R.V.G. Ravi Kumar
Organizing Secretaries

Dr. A.B. Koteswara Rao
Principal,
GVPCE(A)

Prof. P. Somaraju
Secretary
Gayatri Vidya Parishad

International Conference on Latest Advances, Contributions and Applications in Non-Linear Analysis (LACANA) & Centenary Birthday Celebrations of Prof V. Lakshmikantham

(13th - 16th March 2024)

Gayatri Vidya Parishad
Prof. V. lakshmikantham Institute for Advanced Studies
&
Gayatri Vidya Parishad College of Engineering (Autonomous)

Cordially invite you to the Centenary Birthday Celebrations of Prof. V. Lakshmikantham on 16th March 2024 (Saturday)

Dr. S. Sundar

Director, NIT, Mizoram
has kindly consented to be the Chief Guest
&

Dr. M. A. Pathan

Aligarh Muslim University, Aligarh
consented to be the Guest of Honour

Prof. Dr. Ing. P.S. Rao

President, Gayatri Vidya Parishad
will address the gathering

Time : 9.30 AM
Venue : Main Auditorium
Gayatri Vidya Parishad College of Engineering (Autonomous)
Madhurawada, Visakhapatnam.

Dr. J. Vasundhara Devi
Dr. R.V.G. Ravi Kumar
Organizing Secretaries

Dr. A.B. Koteswara Rao
Principal
GVPCE(A)

Prof. P. Somaraju
Secretary
Gayatri Vidya Parishad

GUEST OF HONOUR

Dr. Vipparthi Adimurthy

Mission Concept Designer for Chandrayaan I, Chandrayaan 2 & Mangalyaan

Vipparthi Adimurthy is a distinguished figure in space science and technology, known for his significant contributions to rocket technology and space dynamics. He began his career with the Indian Space Research Organisation (ISRO), where he served at the Vikram Sarabhai Space Centre (VSSC) in Thiruvananthapuram, eventually rising to the position of associate director. After he retired from VSSC in 2010, Adimurthy took on the role of Satish Dhawan Professor at the Indian Institute of Space Science and Technology (IIST), where he also served as Dean of Research & Development. Currently, he holds the esteemed position of ISRO Honorary Distinguished Professor at VSSC. Throughout his career, Adimurthy has received numerous honours and awards, including the Padma Shri from the Government of India in 2012 for his outstanding contributions to space dynamics. He has also been recognized internationally, receiving the International Achievement Award Laurel for Team Achievement for his work on Chandrayaan-1, India's first lunar probe, in 2013. Adimurthy's expertise and leadership have made significant strides in advancing India's capabilities in space exploration and technology.

CHIEF GUEST

Dr. Abraham Varughese

OS & Director - Naval Science & Technological Laboratory

Dr. Abraham Varughese, an accomplished scientist, assumed the position of Director at the Naval Science and Technological Laboratory (NSTL) on July 1st, 2023. With degrees from the University of Kerala and IIT Delhi, he holds a PhD in Computer Science & Engineering from Andhra University, earning a Gold Medal for Best PhD in Engineering. Dr. Varughese boasts over three decades of experience in naval systems design and development, particularly in underwater weapons. As Programme Director for Strategic Projects, he played key roles in torpedo development. Additionally, he serves as Chairman of IEEE Visakhapatnam Bay Section and Fellow & Past Chairman of IETE Visakhapatnam Centre. Dr Varughese is actively involved in academia as a member of the Board of Studies at Andhra University and as a Life Member of professional societies like the Computer Society of India and Instrument Society of India. He also leads AHAMAHAMIKA, an NSTL Education Society initiative promoting children's reading habits.

Report by the Organizing Secretary

It is indeed a blessing and a rare privilege to present the following report on behalf of the organizing secretaries of this unique conference, organized as a part of the centenary celebrations of Professor V. Lakshmikantham.

Gayatri Vidya Parishad-Prof. V. Lakshmikantham Institute for Advanced Studies (GVP-LIAS) is the brainchild of Prof. V. Lakshmikantham. He had a passion for knowledge and the generosity to help people interested in learning. He dreamt of India becoming a world leader in creating and promoting knowledge and being a man of action, a pioneer, and worked towards establishing a private University in India.

Being a visionary beyond his times, he could not reach his goal but his efforts resulted in the establishment of Gayatri Vidya Parishad – Professor V. Lakshmikantham Institute for Advanced Studies. This Institute follows the guidelines suggested by him and organizes workshops, conferences and other research activities.

The period from 16th March 2023 to 16th March 2024 is a special one as it marks the centenary year of the Professor. In honor and recognition of the genius mathematician Gayatri Vidya Parishad has decided to celebrate the whole year by organizing workshops and lectures and culminate it with an International Conference.

A summary of the activities in this time frame is as follows:

The Centenary year celebrations of the Late Prof. V. Lakshmikantham, have been inaugurated by Dr. S. Sundar, Director, NIT Mizoram, DAAD Research Ambassador and Professor, Dept. of Mathematics, IIT Madras, Chennai on 16th March, 2023.

As a part of the celebrations, we have organized

1. One week national workshop on, 'Mathematics for Machine Learning from 13th March 2023 to 17th March 2023. This event was organized in association with Dept. of Mathematics, IIT (M).
2. With an idea of providing a short introduction and introducing the concepts and terminology in machine learning, GVP-LIAS in association with the Dept. of Mathematics organized a short course of 10 hours on Introduction to Machine Learning (online) from 22nd June to 5th July. The resource person was Mr D. Satyaprasad (PhD, IIT(M)). This course was well attended by two international professors, the director, IC, and JNTU(K) among others.
3. GVP-LIAS is organizing a series of lectures on Vedic Mathematics by the Grand Lady Professor Dr. C. Santamma, Professor at Centurion University, Vizianagaram, and retired Professor from the Department of Physics at Andhra University. The first lecture was given on 1st July 2023 on Vedic addition, the second one dealt with Vedic multiplication and was on 4th July 2023, and the third one on Vedic division took place on 12th Sept. 2023. She is planning to give lectures on Calculus in Vedic Mathematics.

4. One-week workshop on "Statistics for Machine Learning" was organized from 18-12-2023 to 22-12-2023

5. As a Tribute to Prof. V. Lakshmikantham a series of five lectures was given by Dr. J. Vasundhara Devi from 19-02-24 to 23.02.24

As a finale of the celebrations of the birth centenary year of Professor V.Lakshmikantham, a conference on the Latest Advances, Contributions and Applications in Non Linear Analysis (LACANA) Conference was proposed to be conducted from 13th to 16th, March 2024. As 16th March is Professor Lakshmikantham's birthday, it was planned to conclude the celebrations on that day.

LACANA Conference started on 13th March 2024 with the ceremonial lighting of the lamp by key dignitaries that included Prof. P.S.Rao, President of GVP Institutions, Prof Adi Murthy, Distinguished Space Scientist, Dr. A. Varughese NSTL Director, Prof. A.B. Koteswara Rao, Principal GVP College of Engineering (Autonomous) and Dr.P.Somaraju garu among others

Dr. P. S. Rao Garu gave a brief overview of the dream, and vision of the GVP, the birth of various institutions including the creation of GVP-LIAS. The contributions of Prof Lakshikantam in the creation of GVP-LIAS were acknowledged. Prof Adi Murthy provided a brief on the glory of Prof Lakshmikantam by recalling the usage of his contributions in designing space missions. Dr.Varughese mentioned the usage of Prof Lakshmikantam's contributions in his professional career. Prof. Koteswara Rao recalled his association with Prof Lakshmikantam as a privilege and reflected on various programs held in honour of the great professor. Eminent speakers from various premier institutes and others across the country felt honoured and readily accepted to participate in the conference and the celebrations.

The conference conducted over 4 days provided a great opportunity for various speakers working across a wide array of domains to share their knowledge and a good platform was provided for people to be aware of recent developments in technology and their applications. Overall there are 4 plenary (one-hour speakers), 30 (forty-minute) speakers, 18 (twenty minutes) speakers and 58 paper presenters. While each one is a specialist in their domain of research, we would like to make a special mention of some stalwarts who were kind enough to grace the conference.

Padmashree awardee Dr. V. Adimurthy Garu gave a plenary lecture and also interacted with young children and students. Dr. Vedula Sastry Garu gave practical exposure to the solar and windmill structures available in GVP Institutes and the details of storing and using the power. Dr.V.Kannan, an analyst of a very high order was a plenary speaker on the third day and Professor S. Sundar will address the August gathering in a couple of hours.

Dr. T. Gnana Bhaskar, Professor and Chairman Dept. of Mathematics, Florida Institute of Technology, USA and Dr. Usha Sridhar, University of Technology, Sydney, Australia are researchers from abroad. I am extremely grateful to them for accepting our invitation immediately without any hesitation.

The GVP-LIAS and GVPCE(A) were fortunate to have the presence of stalwarts like Prof. M. A. Pathan, AMU, Prof. A. K. Nandakumaran, IISc, Prof. Pankaj Srivastava, MNNIT, Dr. S.Bhalekar, UoH, Dr.Birajdar, ICT, Dr. S.B.Joshi, Sangli, Dr. N.Selvaganesan, IIST, Dr. B.C.Dhage, Latur among others.

The lectures covered a variety of topics ranging from analysis, PDEs, machine learning, and artificial intelligence to cyber-related developments, among others, providing valuable learning for all participants.

GVP encourages talents and provides opportunities for students to harness them. A special mention is to be made of the mementoes provided to various speakers. These are hand-created paintings with a provision of wall hanging created by the students of GVP College of Engineering (Autonomous) with support and guidance from Dr. Y. Aparna Rao. The GVPCE and GVP-LIAS are proud of all our students who have contributed and will encourage them in all possible ways to reach their true potential.

This centenary celebrations and the conference outcome were the combined efforts of all of us at GVPCE (A) and GVP-LIAS. We acknowledge the contributions and teamwork of one and all in this regard.

Salutations to our various gurus and sincere thanks to parents, teachers and others whose valuable inputs and motivation enabled us to undertake and successfully complete this task. I conclude, quoting Prof. V. Lakshmikantham,

Salutations to you all, Sat Chitananada Swarupulu, Children of Immortal Bliss.

Dr. J. Vasundhara Devi
Professor
Department of Mathematics and
Gayatri Vidya Parishad – Prof. V. Lakshmikantham Institute for Advanced Studies
Gayatri Vidya Parishad College of Engineering (Autonomous)
Madhurawada
Visakhapatnam -530048
India.

About GVP-LIAS

GVP-Prof. V. Lakshmikantham Institute for Advanced Studies

GVP-Prof. V. Lakshmikantham Institute for Advanced Studies (GVP-LIAS) since its inception in 2007 took active part in supporting and promoting the ideas of Prof. V. Lakshmikantham. The institute uses its sphere of influence and helps to bring resource persons from various parts of the world. It believes in cooperation and works in collaboration with the Department of Mathematics, in particular all engineering departments and GVP-Institutions. Three funded research projects, "A Qualitative study of Set Differential Equations Involving Causal Operators with Memory" (DST), "A Qualitative Study of Graph Differential Equations and Matrix Differential Equations" (NBHM) and "A Computational Study of Fractional Differential Equations" (SERB). At least 20 books have been completed by the members of GVP-LIAS since its inception. This includes textbook, scientific research monographs, felicitation volumes, and proceedings of the conferences as well as books published in native languages Telugu and Marathi. LIAS has organized many national conferences and four International conferences, titled RAMSA (2009, 2013, 2017 and 2021). GVP-LIAS is organizing various events during the centenary year of Prof. V. Lakshmikantham.

About GVPCE (A)

Gayatri Vidya Parishad College of Engineering (A)

Gayatri Vidya Parishad (GVP) was established in 1988 as an educational trust by a group of eminent educationists, academicians, industrialists, and those with a touch of human values to empower the young generation with a high-quality technological education.

The engineering education by GVP society was established under the leadership of Prof. Dr. Ing. P.S. Rao, former Professor & Dean of Industrial Consultancy and Sponsored Research, IIT Madras, GVPCE(A) was initially started four B. Tech programs with an initial intake of 200.

Now the college is offering 10 B.Tech programs and Nine M.Tech and One M.C.A program with a total intake of 1362 students. The college is accredited by NBA of AICTE and accredited by NAAC with 'A' grade with CGPA Of3.47/4.00. Autonomous status was recommended by UGC and conferred by JNTU-K in the year 2009.

The institute reached another mammoth milestone by receiving fund to the tune of Rs. 4 crore under sub-component 1.2 of Technical Education Quality Improvement Program Phase II (TEQIP- II) for Scaling-up PG Education and demand-driven Research & Development and Innovation in the country. It is recognized by Indian Society for Technical Education as "The Best Engineering College" of Andhra Pradesh and Telangana States. The college boasts of an established Skill Development Centre with 6 Laboratories in tandem with APSSDC and Siemens and a dedicated Incubation Centre with 10 start-ups at work under Centre for Innovation.

Works of Prof. V. Lakshmikantham

Professor V. Lakshmikantham is an outstanding mathematician with an uncanny ability to sense the importance of a new idea, diligence and dedication in bringing that idea to a successful completion and keeping the door open for others to pursue that idea. His mathematical interests are many and as the readers know, he has initiated, publicized and popularized several areas of Nonlinear Analysis, too many to enumerate here. If one were to scan through his complete works, one will be amazed at the immensity and diversity of areas of Nonlinear Analysis that he has contributed to and encouraged others to follow. He has been a WORLD-CLASS TEACHER par excellence. We are indeed very grateful for the many years of collaboration with him. We have wondered at his undivided attention in completing a task, his quick-silver mind and photographic memory, yet we have not been saved from his intense impatience since it is quite a formidable task to keep up with his pace and level of dedication. However, if we show our interest and if we are ready to give our best, he is always there to help with enormous patience and kindness.

Professor V. Lakshmikantham has the wonderful capacity to get to the core of an idea without getting bogged down by the details at the outset and then formulate his plan of action. One has to cultivate that trait to be successful in Mathematical Research, particularly inexperienced young researchers. The number of collaborators and co-authors in his works attests to his universal appeal as a world-class mentor. He is a great educator, wise administrator, able organizer and a true friend. He is truly a world citizen and a great soul. In spite of his late entry into academic arena, his contributions and achievements in the field of mathematics are phenomenal, both in quality and quantity. His love of humanity irrespective of race, gender or country is really exemplary. History, Metaphysics, and Poetry are all subjects near to his heart and intellect. His vision of having a global forum for Nonlinear Analysts from all parts of the world to come together for cordial exchange of ideas and results has been realized. Hundreds of young mathematicians and students around the world who have been inspired and encouraged by him will bear testimony to his boundless creative energy and relentless pursuit of knowledge.

Differential and Integral Inequalities. I. [Academic Press, New York, 1969. (with S. Leela).]

The Differential and Integral Inequalities Theory and Applications is the first research monograph published by Professor V. Lakshmikantham and Dr S. Leela. It consists of two volumes, and the entire work is intended to be a guide to the literature available and a textbook for advanced courses. This unifying theme resulted in a systematic development of the theory and applications of differential inequalities and Volterra integral inequalities. The main tools used are the norm and the Lyapunov function. These volumes are considered as the Bible for researchers in differential equations. These volumes appeared in a series inspired and edited by Professor R. Bellman.

Differential and Integral Inequalities. II. [Academic Press, New York, 1969. (with S. Leela).]

The Differential and Integral Inequalities Theory and Applications - Volume II deals with differential equations with time lag or delay, partial differential equations of the first order (parabolic and hyper parabolic type, respectively), and differential equations in abstract spaces, to name a few. Some special features of both the volumes include a treatment of mini-max solutions, a variety of qualitative problems that employ the comparison technique, and a unified investigation of the various types of stability and boundedness concepts.

Differential Equations in Abstract Spaces. [Academic Press, New York, 1972. (with G. Ladas).]

The theory of differential equations in abstract spaces is a fascinating field with important applications to several areas of analysis and other branches of mathematics. This book introduces the nonspecialist to an elegant theory and powerful techniques. The fundamental theory of differential equations in Banach spaces is given and the study of differential inequalities is discussed in Hilbert spaces. A number of examples and applications to functional and partial differential equations given throughout the book illustrate the abstract results presented in the book.

An Introduction to Nonlinear Boundary Value Problems. [Academic Press, New York,1974. (with S.R. Bernfeld).]

The theory of nonlinear boundary value problems is an extremely important and interesting area of research in differential equations. The study is substantially more difficult than that of initial value problems because of the entirely different nature of the underlying physical processes, the book consists of a variety of techniques that are employed in the theory of nonlinear boundary value problems. To name some;
methods that involve differential inequalities, shooting and angular function techniques, functional analytic approaches, topological methods.

Random Differential Inequalities. [Academic Press, New York, 1980. (with G.S. Ladde).]

A differential system can involve random behaviour in three ways: (1) random forcing functions, (ii) random initial conditions, and (iii) random coefficients. Problems in which randomness is limited to (i) and (ii) are relatively simple so investigate. However, the most interesting case of random differential equations is (iii) when combined with (i) and (ii). The present book offers a systematic treatment of random differential inequalities and its theory and application depending on the different modes of probabilistic analysis, namely, approach through sample calculus, LP-mean calculus, and Itô-Doob calculus. A unified treatment of stability theory through random Lyapunov functions and random comparison method is given and the role of the method of variation of parameters in the stability analysis of stochastic perturbed systems is exhibited.

An Introduction to Nonlinear Differential Equations in Abstract Spaces. [Pergamon Press, Oxford, 1981. (with S. Leela).]

This monograph exposes the reader to the current state of the theory of nonlinear differential equations in a Banach Space. It contains the existence theory for differential equations with continuous and discontinuous right-hand side, as well as the fundamental properties of solutions and qualitative theory. Furthermore, some special topics, such as existence theory relative to weak topology, abstract nonlinear boundary value problems, monotone iterative methods, delay differential equations, and Volterra integral equations, have been presented.

Monotone Iterative Techniques in Nonlinear Differential Equations. Pitman Publishing. [London, 1985. (with G.S. Ladde and A.S. Vatsala)].

This book presents method of lower and upper solutions and the monotone iterative technique. This coupling yields a flexible mechanism that offers theoretical, as well as constructive, existence results in a closed set, that is, a closed. sector. The basic theory is developed and the common features are exhibited providing an insight into various problems involving ordinary differential equations and partial differential equations.

Theory of Oscillation for Differential Equations with Deviating Arguments. [Marcel Dekker,]

This book offers a systematic treatment of oscillation and nonoscillation theory of differential equations with deviating arguments. This is because. The mathematical modelling of several real-world problems leads to differential equations that depend on the history rather than only the current state. The models may have discrete time lags as well as distributed lags or delays. Most of the work in the theory of oscillations is centred around second or higher order ordinary differential equations (ODE) because the first order scalar ODEs do not possess oscillatory behaviour.

Theory of Difference Equations and Numerical Analysis. [Academic Press, New York, 1988. (with D. Trigiante).]

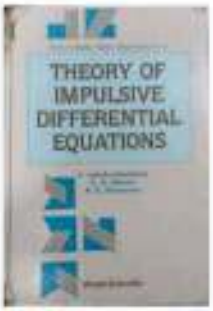
The book offers a systematic treatment of the theory of difference equations and its applications. It concentrates on iterative processes and numerical methods for differential equations. The investigation of these subjects was from the point of view of difference equations which resulted in systematizing and clarifying the ideas involved in the process.

Nonlinear Problems in Abstract Cones. [Academic Press, New York, 1988. (with D. Guo).]

In many mathematical models one needs to discuss the existence of nonnegative solutions with certain desired qualitative properties. This nonnegativity can be developed by arbitrary cones, that is, closed convex subsets of the space under consideration. Further, in the study of large-scale dynamical systems by the method of vector Lyapunov functions, employing arbitrary cones offers better results than using component wise inequalities. Thus, investigating nonlinear problems through abstract cones is an important branch of nonlinear analysis, and this book is devoted to a systematic study of nonlinear problems in abstract cones.

Stability Analysis of Nonlinear Systems. [Marcel Dekker, New York, 1989. (with S. Leela and A.A. Martynyuk).]

This book presents a systematic account of the recent developments and describe the current state of the useful theory. A systematic study of stability theory in terms of two different measures and the advantage of employing families of Lyapunov functions is presented in this work. The theory of a variety of inequalities are discussed bringing out the under- lying theme; and the general Lyapunov method which can be adapted to study various apparently diverse nonlinear problems is given. This book also stresses the importance of utilizing different forms of nonlinear variation of parametric formulae to discuss qualitative behaviors of nonlinear problems.

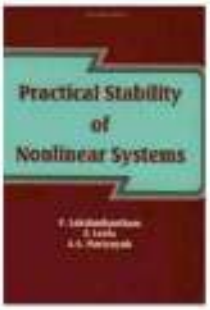


Theory of Impulsive Differential Equations. [World Scientific, Singapore, 1989. (with D.D. Bainov and P. Simeonov).]

The impulsive differential equations, that is, differential equations involving impulse effects, appear as a natural description of observed evolution phenomena of several real-world problems. Its theory is much richer than the corresponding theory of differential equations without impulse effects. For example, initial value problems of such equations may not, in general, possess any solutions at all even when the corresponding differential equation is smooth enough, fundamental properties such as continuous dependence relative to initial data may be violated, and qualitative properties like stability may need a suitable new interpretation. Moreover, a simple impulsive differential equation may exhibit several new phenomena such as rhythmical beating, merging of solutions, and non-continuality of solutions. This monograph describes the forementioned concepts and presents the theory of basic differential inequalities, Lyapunov stability, monotone iterative technique in this setup, among other topics.

Stability of Motion: The Metod of Integral Inequalities. [Naukova Dumka, Kiev, 1991. [Russian]. (with S. Leela and A.A. Martynyuk).]

Russian Book.



Practical Stability of Nonlinear Systems.[World Scientific, Singapore, 1990. (with S. Leela and A.A. Martynyuk).]

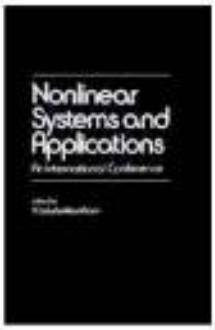
In the stabilization of nonlinear systems interesting set of problems deals with bringing states close to certain sets rather than to the particular state x = 0. From a practical point of view, a concrete system will be considered stable if the deviations of the motions from the equilibrium remain within certain bounds determined by the physical situation, in case the initial values and/or the disturbances are bounded by suitable constraints. The desired state of a system may be mathematically unstable and yet the system may oscillate sufficiently near this state that its performance is acceptable. Many aircraft and missiles behave in this manner. Thus a notion of stability which is neither weaker nor stronger than Lyapunov stability is desired from practical considerations. LaSalle and Lefschetz in their book, [1], suggested a name for such a concept and called it "practical stability". The book presents a systematic account of the development, describes the current state of the useful theory and provides a unified general structure of practical stability concepts applicable to a variety of nonlinear problems of diverse interest.

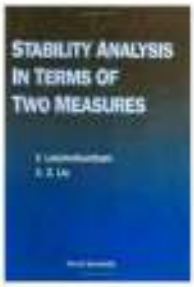
Vector Lyapunov Functions and Stability Analysis of Nonlinear Systems. [Kluwer Academic Publishers, Dordrecht, 1991. (with V.M. Matrosov and S. Sivasundaram).]

In this book the Lyapunov function has been used to its potential. The Lyapunov function is used as a vehicle to transform a given complicated differential system into a relatively simpler differential system and hence it is sufficient to study the properties of solutions of this simple differential equation. Employing several Lyapunov functions instead of one is more useful and the corresponding theory is known as the method of vector Lyapunov functions. This method offers a very flexible mechanism as each component function of the vector function can satisfy fewer rigid requirements. As finding Lyapunov functions is difficult, weakening the requirements of the Lyapunov function and enlarging the class of Lyapunov functions is of great interest. This method is effective in studying the stability properties of a large-scale dynamic system where the given large system is decomposed into interconnected subsystems. This book presents the current status of this approach, provides new directions and offers a unified general structure applicable to a variety of nonlinear systems.

(Proceedings of the International Symposium)

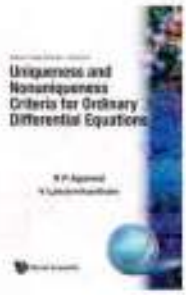






Stability Analysis in Terms of Two Measures. [World Scientific Publishers, Singapore,1993. (with X. Liu).]

The concepts of Lyapunov stability have given rise to many new notions that are important in applications. For example, eventual stability, partial stability, relative stability, conditional stability, total stability, and corresponding boundedness and practical stability notions to name a few. Relative to each concept, there exists a sufficient literature parallel to Lyapunov's theory of stability. A notion which unifies and includes a variety of known concepts of stability in a single set is stability in terms of two measures. This monograph presents a systematic account of recent developments in the stability theory in terms of two distinct measures, describes the current state of the art, shows the essential unity achieved by wealth of applications, and provides a unified general structure applicable to several nonlinear problems.



Uniqueness and Nonuniqueness Criteria for Ordinary Differential Equations. [World Scientific Publishers, Singapore, 1993. (with R.P. Agarwal).]

The question of the existence and uniqueness of solutions of differential equations is an age-old important problem. Research has continued to find, refine, and generalize uniqueness conditions, resulting in an enormous amount of literature. The idea behind this monograph is to bring all the available uniqueness criteria into one volume, so that a comparative study can be made, this work systematically describes the existing literature, and compares and contrasts the merits of various known criteria, discusses open problems and offers some directions towards possible solutions.

Monotone Iterative Techniques for Discontinuous Differential Equations. [Marcel Dekker, New York, 1993. (with S. Heikkila).]

A generalized monotone iterative method in the context of partially ordered sets based on elementary set theory and using well-ordered chains of iterations has been developed in this monograph. It was then applied to derive suitable fixed-point theorems in ordered abstract spaces which are important tools in the investigation of existence and comparison results for discontinuous nonlinear problems. The aim of this book is to develop the basic theory, exhibit its common features and provide insight into certain discontinuous problems of ordinary and partial differential equations by means of systematic application of the developed techniques, including some problems at resonance. It offers a comprehensive treatment of existence and comparison of extremal strong, weak, or mild solutions to discontinuous differential equations in ordered Banach spaces without requiring any kind of compactness hypothesis among other interesting topics.

Theory of Integro-Differential Equations. [Gordon and Breach, Amsterdam, 1995. (with M.R.M. Rao).]

Integro-differential equations arise quite frequently as mathematical models in diverse disciplines. The work of Volterra on the problem of competing species is of fundamental importance for the development of mathematical modelling of real-world problems. From those beginnings, the theory, and applications of Volterra integro-differential equations with bounded and unbounded delays have emerged as new areas of investigation. This monograph provides the basic theory and qualitative properties of solutions of Volterra integro-differential equations, together with many applications.

Theory of Differential Equations with Unbounded Delay. [Kluwer Academic Publishers, Dordrecht, 1994. (with L. Wen and B.G. Zhang).]

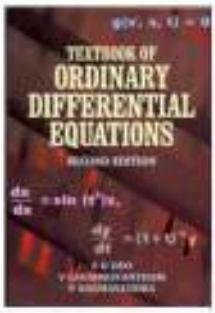
This monograph presents a systematic and unified theory of recent developments of equations with unbounded delay. It describes the developments in the theory and brings out the essential unity achieved and provides a general structure applicable to a variety of problems. It presents a unified framework to investigate the basic existence theory for a variety of equations with delay and treats the classification of equations with memory precisely to bring out the subtle differences between them.

Dynamic Systems on Measure Chains. [Kluwer Academic Publishers, Dordrecht, 1996. (with B. Kaymakcalan and S. Sivasundaram).]

From a modeling point of view, it is perhaps more realistic to model a phenomenon by a dynamic system which incorporates both continuous and discrete times, namely, time as an arbitrary closed set of reals called timescale or measure chain. The theory of dynamic systems on time scales offers a framework which permits us to handle both dynamic systems continuous and discrete simultaneously. This book demonstrates the interplay of the two different theories, namely, the theory of continuous and discrete dynamic systems, imbedded in one unified framework. It contains the development of the theory of dynamic systems on time scales from a qualitative point of view.

Nonlinear Integral Equations in Abstract Spaces. [Kluwer Academic Publishers, Dordrecht, 1996. (with D. Guo and X. Liu).]

Many problems arising in the physical sciences, engineering, biology, and applied mathematics lead to mathematical models described by nonlinear integral equations in abstract spaces. This book is devoted to a comprehensive treatment of nonlinear integral equations in abstract spaces. It is the first book that is dedicated to a systematic development of this subject. Some of the important topics include nonlinear integral equations in Banach spaces, including equations of Fredholm type, equations of Volterra type and equations of Hammerstein type.



Textbook of Ordinary Differential Equations. [Tata McGraw-Hill, New-Delhi, 1997. (with S.G. Deo and V. Raghavendra).]

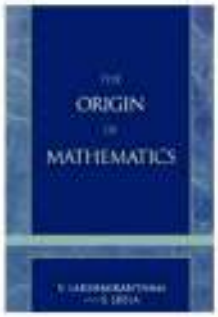
The book aims to bring together the qualitative theory of differential equations systematically at an introductory level. Book contains the results of linear equations and systems, solutions by the series method, the existence and uniqueness of nonlinear initial value problems (both local and non-local) and the stability theory of linear and nonlinear equations. At an elementary level it also includes results of oscillation, boundary value problems and elements of control theory. All the results have been presented in easy and lucid language.

Method of Variation of Parameters for Dynamic Systems. [Gordon and Breach, Amester-dam, 1998. (with S.G. Deo).]

The monograph presents a unified approach to the methods of linear and nonlinear variation of parameters together with its generalizations, extensions and refinements. It develops the blending of the two important techniques, namely Method of variation of parameters and Lyapunov like functions and comparison principle. An effort has been made to exhibit the role of the method of variation parameters in a variety of dynamic systems in this volume.

Generalized Quasilinearizations for Nonlinear Problems. [Kluwer Academic Publishers, Dordrecht, 1998. (with A.S. Vatsala).]

As finding explicit analytic solutions of nonlinear problems in terms of familiar, well- trained functions of analysis are rarely possible, one needs to exploit various approximate methods. The approach is to construct a sequence of linear differential equations the solutions of which are known. These solutions of the simpler differential equations can be employed to bound the solutions of original problem. This technique brings into play the theories of differential and integral inequalities and monotone operators. A systematic way of obtaining these bounding functions is furnished by the method known as quasilinearization, which combines linear approximation techniques with capabilities of the digital computer in various adroit fashions. The approximations are constructed to yield rapid convergence and monotonicity as well. The origin of quasilinearization lies in the theory of dynamic programming. Extensions, refinements and generalizations gave rise to several possibilities and the method of generalized quasilinearization was introduced.



The Origin of Mathematics. [University Press of America, Lanham, 2000. (with S. Leela).]

This book challenges the Eurocentric approach to the history of the world, imposed on others. It condemns the European version of knowledge and brings out how the European scholarship has done immeasurable harm to ancient Indian history and mathematical knowledge. An effort was made to correct the history of India, correct the timeline of our famous personalities like Aryabhattam and Sankara charya. Using the references of foreign researchers the antiquity and the authenticity of Sulvasutras etc. were given. A gist of the contributions of Indians to Mathematics was given in this book.

Proceedings of the First World Congress of Nonlinear Analysts

Theory of Difference Equations: Numerical Analysis and Applications. [Marcel Dekker, New York, 2002. (with D. Trigiante).]

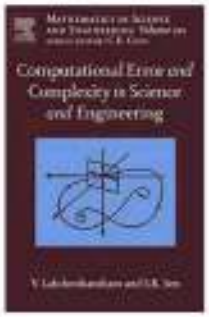
Difference equations appear as a natural description of observed evolution phenomena because most measurements of time evolving variables are discrete. More importantly, difference equations also appear in the study of discretization methods for differential equations. The present book offers a systematic treatment of the theory of difference equations and its applications to numerical analysis. The book focuses on iterative processes and numerical methods for difference equations. The book consists of development of the theory of difference inequalities and the various comparison results, a unified treatment of stability theory through Lyapunov functions and comparison method among other topics.

Monotone Flows and Rapid Convergence for Partial Differential Equations. [Taylor and Francis, London, 2003. (with S. Koksal).]

In this monograph, the ideas of the method of upper and lower solutions, the iterative techniques - Monotone iterative method and quasilinearization and their generalizations have been extended to partial differential equations. It contains a unified approach for studying elliptic parabolic and hyperbolic equations. The monograph has been divided into two parts: the first part describes the general methodology systematically utilizing the classical approach and the second part exhibits the development of the same basic ideas via variational techniques. In each case, this methodology was applied to elliptic parabolic and hyperbolic equations so that one can understand and appreciate the intricacies involved in the various extensions.

Theory of Fuzzy Differential Equations. [Taylor and Francis, London, 2003. (with R. Mohapatra).]

In 1965, Zadeh initiated the development of the modified set theory known as fuzzy set theory, which is a tool that makes possible the description of vague notions and manipulations with them. The basic idea of fuzzy set theory is simple and natural. A fuzzy set is a function from a set into a lattice or as a special case, into the interval [0, 1]. Using it, one can model the meaning of vague notions and certain kinds of human reasoning. This book contains the basic theory of fuzzy differential equations. The extension of the Lyapunov-like theory of stability and several new areas of investigation relative to fuzzy dynamic systems are given. Fuzzy differential inclusions are introduced and properties of solution sets, stability and periodicity in a framework suggested by Hüllermeir are presented.



Computational Error and Complexity in Science and Engineering. [Elsevier, Amsterdam, 2005. (with S.K. Sen).]

The monograph focuses on an estimation of the quality of the results/outputs produced by an algorithm in scientific and engineering computation. In addition, the cost to produce such results by the algorithm is also estimated. The former estimation refers to error computation while the later estimation refers to complexity computation. This book is mainly intended for the graduate students in engineering, computer science, and mathematics. The monograph is precisely an exposition of both error and complexity over different types of algorithms including exponential/combinatorial ones.

Theory of Causal Differential Equations (with Dr Leela, Dr McRae and Dr Drici.)

The monograph is dedicated to the investigation of the theory of causal differential equations or differential equations with causal operators, which are nonanticipative or abstract Volterra operators. It showcases that causal differential equations include a variety of dynamic systems and points that the theory developed for Causal Differential Equations in general, includes the theory of several dynamic systems in a single framework.

The Hybrid Grand Unified Theory

This book is an attempt to provide a hybrid grand unified theory to understand the universe, both in its micro/quantum aspects as well as macro/galactic aspects. It is truly a hybrid theory as it tried to encompass both the modern and ancient theories of the universe, together with its functioning at all levels of human comprehension. An interesting quote from the preface of the book is as follows the physicist is interested in discovering the laws of inanimate nature and the mathematician uses the depth of his thought into exploring the mathematical concepts. But the symbiotic connection between physics and mathematics and the enormous usefulness of mathematics in the natural sciences is something quite mysterious. No rational justification appears to be satisfactory to understand the uncanny success of mathematics and its role in physical theories. A possible explanation is that the laws of nature are written in the language of mathematics.

Theory of Set Differential Equations in Metric Spaces

Multivalued differential equations (now known as set differential equations (SDES)) generated by multivalued differential inclusions have been introduced in a semi-linear metric space, consisting of all nonempty, compact, convex subsets of an initial finite or infinite dimensional space. The basic existence and uniqueness results of such SDEs have been investigated and their solutions have compact, convex values. Also, these generated SDEs have been employed as a tool to prove the existence of solutions, in a unified way, of multivalued differential inclusions.

This study includes the methods of single, vector, matrix and cone-valued Lyapunov-like functions by an appropriate choice of the metric space Since the basic space utilized to define the metric space is restricted to R an approach is given on how one can extend most of the results described when we choose a Banach space E instead of R. It is the first book that attempts to describe the theory of set differential equations as an independent discipline. It incorporates, the recent general theory of set differential equations, discusses the interconnections between set differential equations and fuzzy differential equations and uses both smooth and nonsmooth analysis for investigation among other topics.

The Origin of Human Past - Children of Immortal Bliss [Bhavan publications 1 January 1999]

This is the first work in History by Prof. V. Lakshmikantham. Motivated the book, ' India in Greece', by Pockoke, He collected material from various indigenous sources like Vedas, studied articles written by scholars in regional languages and worked like a soldier for 20 years to write this book. He mastered many fields of knowledge ranging from history, geography, philosophy, philology to anthropology, astronomy and astrology. He tried to give India it's pristine place among the nations of the world.

Theory of Fractional dynamic systems

The concept of a non-integer order derivative called as fractional derivative was introduced around 17th century and the calculus of fractional derivatives was complete by 19th century. The study of the theory of nonlinear fractional dynamic systems attracted the attention of Prof. Lakshmikantham. The fundamental differential inequalities and the basic comparison results were developed by his group. This book consists of qualitative theory of fractional dynamic systems, iterative techniques, stability theory and some types of differential equations involving fractional order derivatives.

What India should know

This is a very passionate work of Prof. Lakshmikantham. He collected material for more than 20 years before he wrote this book. He mastered history, geography, philosophy, philology to anthropology, astronomy and astrology among other subjects. He recorded like a camera information from the existing literature without expressing his opinion at all. He contradicted the Aryan invasion theory, concept of Dravidian race and tried to correct the time frame, a missing 22 centuries of time. Further, the various measures of time are described in this book. This work places Sanatana Dharma its pristine position and instils pride in the heart of the reader about our nation, culture and civilization.

The Origin and History of Mathematics, [Cambridge Scientific Publishers, U.K, 2005, with J. Vasundhara Devi and S. Leela.]

This book challenges the Eurocentric approach to the history of the world, imposed on others. It condemns the European version of knowledge and brings out how the European scholarship has done immeasurable harm to ancient Indian history and mathematical knowledge. An effort was made to correct the history of India, correct the timeline of our famous personalities like Aryabhata and Sankara charya. Using the references of foreign researchers the antiquity and the authenticity of Sulvasutras etc. were given. A gist of the contributions of Mathematicians from the past four centuries were given in this book. A special section was devoted to Ramanujan and to our ancient treasures like Srichakram, and techniques in Vedic Mathematics.

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LACANA - The International Conference - Schedule

Venue 1: Auditorium				
Date	**Time**	**Type**	**Speaker**	**Topic**
13-03-2024	**10:00 AM - 11:15 AM**	Inaugural Function : Chief Guest : Dr. Abraham Varughese, Director, NSTL, Vizag Guest of honor : Dr V Adimurthy, Padmasree Awardee, ISRO		
13-03-2024	**11:30 AM - 12:45 PM**	Plenary	Dr V Adimurthy, Padmasree Awardee, ISRO	Multidisciplinary Interactions in Interplanetary Mission Design
13-03-2024	**02:00 PM - 03:00 PM**	Keynote	Dr. P. V. S. Anand, Rayalaseema University	Artificial Neural Networks approach to singular Matrix Differential Systems
13-03-2024	**03:55 PM - 04:15 PM**	20 Min. Talk	Dr. R.V.V.Murali Krishna, GVPCE(A)	Graph Neural Networks (GNNs) for NLP
13-03-2024	**04:15 PM - 04:35 PM**	20 Min. Talk	Dr. B. Jaya Lakshmi, GVPCE(A)	Subspace Clustering
13-03-2024	**04:35 PM - 04:55 PM**	20 Min. Talk	Dr NVLP Raju, GVPCE(A)	Privacy preserving data publishing with multiple sensitive attributes

LACANA - The International Conference - Schedule

Venue 2: Mini Auditorium (B11-203)				
Date	**Time**	**Type**	**Speaker**	**Topic**
13-03-2024	**02:00 PM - 03:00 PM**	keynote	Dr. B.C.Dhage Nanded	A JOURNEY OF FIXED POINT THEORY AND NONLINEAR DIFFERENTIAL EQUATIONS
13-03-2024	**03:15 PM - 03:35 PM**	20 Min. Talk	Dr. Ch. Srinivasa Rao, Andhra University	Fixed point theorems on B_4-Metric Spaces
13-03-2024	**03:35 PM - 03:55 PM**	20 Min. Talk	Dr.Rupesh Tulshiram More, ACS College Bodwad, Jalgaon, Maharashtra	Existence of solutions for abstract nonlinear integro differential equations via S-Iteration methods
13-03-2024	**03:55 PM - 04:10 PM**	Paper Presenter	Chagdev Kothule	The Heat and Mass Transfer of an Hydro-Magnetic Free Convective Flow Over an Infinite Vertical Plate Inserted in Porous Medium
13-03-2024	**04:10 PM - 04:25 PM**	Paper Presenter	Ekanath Pawar	Dynamic Analysis of Generalised Fractional Differential Problem

LACANA - The International Conference - Schedule

Venue 3: CIVIL Seminar Hall (B8-301)				
Date	**Time**	**Type**	**Speaker**	**Topic**
13-03-2024	02:00 PM - 03:00 PM	keynote	Dr. M. A. Pathan Aligarh Muslim University, Aligarh.	HYPERGEOMETRIC TYPE EXTENDED BIVARIATE ZETA FUNCTION AND LIDSTONE POLYNOMIALS
13-03-2024	03:55 PM - 04:10 PM	Paper Presenter	Kalpana Dadasaheb Jagtap	Arbitrary Order Nonlinear Random Differential Equations
13-03-2024	04:10 PM - 04:25 PM	Paper Presenter	GUMMALA DIVYA KUMARI	
13-03-2024	04:25 PM - 04:40 PM	Paper Presenter	Pavan Dnyanoba Bhosale	
13-03-2024	04:40 PM - 04:55 PM	Paper Presenter	Shyam Bapurao Dhage	Some Fixed Point Theorems for Contractive Mappings in a Eucledian Space Rn

LACANA - The International Conference - Schedule

Venue 4: Mechanical Seminar Hall (B12-304)				
Date	**Time**	**Type**	**Speaker**	**Topic**
13-03-2024	02:00 PM - 02:40 PM	40 Min. Talk	Dr. Sanjay K Darvekar Associate Professor Dept. of Mechanical Engg., GVPCE(A)	Automated surface roughness classification using deep learning and robot vision
13-03-2024	02:40 PM - 03:20 PM	40 Min. Talk	Dr. M. Amrita Associate Professor Dept. of Mechanical Engg., GVPCE(A)	Experimental analysis of 3D printed components
13-03-2024	03:35 PM - 04:15 PM	40 Min. Talk	Dr. S. Rama Krishna Associate Professor Dept. of Mechanical Engg., GVPCE(A)	GUI-Based Expert System for Diagnosing Rotating Machinary Faults
13-03-2024	04:15 PM - 04:55 PM	40 Min. Talk	Dr. Anand Solanki Assistant Professor Dept. of Mechanical Engg., GVPCE(A)	Turbulent Heat Transfer and Pressure drop characteristics of Al2O3-Ethylene glycol and Al2O3 water based nanofluid in the microfin helically coiled

LACANA - The International Conference - Schedule

Venue 5: EEE Seminar Hall (B0-202)				
Date	**Time**	**Type**	**Speaker**	**Topic**
13-03-2024	**02:00 PM - 03:00 PM**	Keynote	Dr. P. Anuradha Kameswari, Andhra University	A Review on the Mathematical tools in the evolution of cryptography
13-03-2024	**03:35 PM - 03:55 PM**	20 Min. Talk	Dr. K. V. S. Sarma	Research Integrity
13-03-2024	**03:55 PM - 04:15 PM**	20 Min. Talk	Dr.V.Radhika, GVP College for Degree And PG, VSP	Quasi Linerization for Impulsive Fractional Differential Equations
13-03-2024	**04:15 PM - 04:30 PM**	Paper Presenter	EMANDI KANAKA MAHA LAKSHMI	Stability Analysis of SIR Epidemic Model with equal birth and death Rates
13-03-2024	**04:30 PM - 04:45 PM**	Paper Presenter	Chevala Janardhan	Stability and Bifurcation in Fractional Order Generalized Logistic Map

LACANA - The International Conference - Schedule

Venue 1: Auditorium				
Date	**Time**	**Type**	**Speaker**	**Topic**
14-03-2024	**09:30 AM - 10:30 AM**	Plenary	Dr. Vedula Sastry	200 kVA, Roof top- Solar wind Hybrid Renewable Energy System with Battery Storage
14-03-2024	**10:45 AM - 11:45 AM**	Keynote	Dr. P. S. Avadhani, Andhra University, Visakhapatnam	Recent Developments in the Applications of Mathematics to Computer Science
14-03-2024	**11:45 PM - 12:25 PM**	40 Min. Talk	V. Madhu, Miracle Software Systems, INC	The Math Behind the Mind: Mastering Calculus and Linear Algebra for Artificial Intelligence
14-03-2024	**12:25 PM - 12:45 PM**	20 Min. Talk	Mr Kanthi Kiran, GVPCE (A)	Advancing Truth Verification in Digital Media: A Novel Approach Leveraging AWD -LSTM and Multi-Stage Transfer Learning
14-03-2024	**02:00 PM - 03:00 PM**	keynote	Dr. Pankaj Srivastava M N NIT, Allahabad, UP.	A Spectrum of Intelligent Tourist Destinations Ranking Information System
14-03-2024	**03:15 PM - 03:55 PM**	40 Min. Talk	Dr B Srinivas, GVPCE (A)	Deep Learning in Medical Diagnosis
14-03-2024	**04:00 PM - 04:40 PM**	40 Min. Talk	Dr B Srinivasulu, GVPCE (A)	Machine Learning Applications in Fuel Cell

LACANA - The International Conference - Schedule

Venue 2: Mini Auditorium (B11-203)				
Date	**Time**	**Type**	**Speaker**	**Topic**
14-03-2024	**10:45 AM - 11:25 AM**	40 Min. Talk	Prof. Kailas S. Ahire	Existence of Uniform Statistical Convergence for Integration and Differentiation of Series of Functions
14-03-2024	**11:25 AM - 11:45 AM**	20 Min. Talk	Dr. Prashant S Sutkar	Flow Characteristics of Micropolar Nanofluid Stuffed Between Viscous Nanofluids: Three-Layer Flow
14-03-2024	**11:45 AM - 12:05 PM**	20 Min. Talk	Dr. Sandeep P Bhairat	Chaos in Protein Aggregation: Experimental Evidence to Growth Rate Sensitivity and Bifurcation Analysis
14-03-2024	**12:05 PM - 12:25 PM**	20 Min. Talk	Dr. Gunvant A Birajdar	Numerical Solution of System of Fractional Diffusion Equations
14-03-2024	**12:25 PM - 12:40 PM**	Paper Presenter	Abhid Khan	Bifurcation Analysis and Chaos Control in New Fractional-order Dynamical System
14-03-2024	**12:40 PM - 12:55 PM**	Paper Presenter	Bharat Pawar	Solution of Partial Differential Equation Using Adomian Decomposition Method
14-03-2024	**02:00 PM - 03:00 PM**	keynote	Dr G V R Babu, Andhra University, Visakhapatnam	Comparision of Harder Stability and Rus Stability of Mann Iteration Procedure
14-03-2024	**03:00 PM - 03:15 PM**	Paper Presenter	Anjali Nanwate	Exploring Chaotic Behavior in Financial Systems via Fractional Order Dynamics
14-03-2024	**03:15 PM - 03:30 PM**	Paper Presenter	Pandurang Kundgar	Method of Upper Lower Solutions for Nonlinear System of Hilfer Fractional Reaction-Diffusion Equations

LACANA - The International Conference - Schedule

Venue 3: CIVIL Seminar Hall (B8-301)				
Date	**Time**	**Type**	**Speaker**	**Topic**
14-03-2024	**10:45 AM - 11:45 AM**	keynote	Dr Voggu Srinivas, CSIR-SERC Chennai	Nonlinear Vibration Features for Damage Assessment in Concrete Structures
14-03-2024	**11:45 AM - 12:05 PM**	20 Min. Talk	Dr L Venkat	The Effect of Vibration Produced from Underground Explosives: Implications for Structural Integrity
14-03-2024	**12:05 AM - 01:05 PM**	keynote	Dr H Prashanth Reddy, IIT Kharagpur	Practical Hydraulics Applications in Free Surfcae Flows and Pressurized Flows
14-03-2024	**02:00 PM - 03:00 PM**	keynote	Dr Pradeep Dammala, IIT Jodhpur	Soil Nonlinearity under Dynamic Loads- Physical and Continuum Modelling
14-03-2024	**03:15 PM - 03:30 PM**	Paper Presenter	Biswajit Kaushik	Numerical solution for Singularity Perturbed Differential Difference Equations using Exponential B-spline Method
14-03-2024	**03:30 PM - 03:45 PM**	Paper Presenter	ARUN BABURAO DAMKONDWAR	

LACANA - The International Conference - Schedule

Venue 4: Mechanical Seminar Hall (B12-304)				
Date	**Time**	**Type**	**Speaker**	**Topic**
14-03-2024	**10:45 AM - 11:45 AM**	Keynote	Dr T Gnana Bhaskar, Florida Institute of Technology, USA	Set Differential Equations: An overview, perspectives and Recent Developments
14-03-2024	**11:45 AM - 12:25 PM**	40 Min. Talk	Dr. K. N V V Vara Prasad, Bilaspur	Results on weak contractions via w-distances
14-03-2024	**12:25 PM - 01:05 PM**	40 Min. Talk	Dr. T. Suman Kumar University of Hyderabad. Hydreabad	A Numerical Scheme to Nonlinear McKendrick-Von Foerster Equation with Diffusion
14-03-2024	**02:00 PM - 03:00 PM**		V Adi Murthy	Interaction with Faculty and Students
14-03-2024	**03:15 PM - 03:30 PM**	Paper Presenter	Kothule Changdev Babasaheb	The Heat and Mass Transfer of a Hydro-Magnetic Free Convective Flow Over an Infinite Vertical Plate Inserted in a Porous Medium
14-03-2024	**03:30 PM - 03:45 PM**	Paper Presenter	Somashekhar C Desai	Class of Paracompactness In Fuzzy Topological Spaces
14-03-2024	**03:45 PM - 04:00 PM**	Paper Presenter	G. Srikanth	A NOTE ON SOLVING CUBICS IN THE CONTEXT OF AN EQUATION-ORIENTED APPROACH FOR PROCESS OPTIMIZATION

LACANA - The International Conference - Schedule

Venue 5: EEE Seminar Hall (B0-202)				
Date	**Time**	**Type**	**Speaker**	**Topic**
14-03-2024	**11:25 AM - 11:45 AM**	20 Min. Talk	B Srinu, GVPCE(A)	Facial Emotion Recognition
14-03-2024	**11:45 AM - 12:00 PM**	Paper Presenter	Dr.Rupesh Tulshiram More, ACS College Bodwad, Jalgaon, Maharashtra	SOME THEOREMS ON ABSTRACT INTEGRODIFFERENTIAL EQUATION VIA S-ITERATION
14-03-2024	**12:00 PM - 12:15 PM**	Paper Presenter	Sheetal Yadav	TBA
14-03-2024	**12:15 PM - 12:30PM**	Paper Presenter	Dr Namdev Shivajirao Jadhav	DHAGE ITERATION METHOD FOR INITIAL VALUE PROBLEMS OF NONLINEAR SECOND ORDER HYBRID FUNCTIONAL DIFFERENTIAL EQUATIONS
14-03-2024	**12:30 PM - 12:45PM**	Paper Presenter	Mangrulkar Bhagyashri Umesh	
14-03-2024	**12:45 PM - 01:00PM**	Paper Presenter	Dr. Gajanan Suresh Patil	Existence and Uniqueness of Solution of Fractional Order Boundary Value Problem with Mixed Boundary Condition via a New Three-Step Iteration Process
14-03-2024	**02:00 PM - 02:15 PM**	Paper Presenter	Bandaru Anusha, IFHE-ICFAI, Founadation for Higher Education Hyderabad	Design and Simulation Study of Disk Brake Wheel using Metal Additive Manufacturing Techniques
14-03-2024	**02:15 PM - 02:30 PM**	Paper Presenter	Bandaru Anusha, IFHE-ICFAI, Founadation for Higher Education Hyderabad	Numerical Investigation on Stress Behavioural Characteristics Prediction of Perforated Plates
14-03-2024	**02:30 PM - 02:45 PM**	Paper Presenter	Mangrulkar Bhagyashri Umesh	
14-03-2024	**02:45 PM - 03:00 PM**	Paper Presenter	Pragati Dutta, Universisty of Hyderabad	Fractional Order 2-Delay Model
14-03-2024	**03:15 PM - 03:30 PM**	Paper Presenter	V. Tulasi	Conversational Recommender Systems
14-03-2024	**03:30 PM - 03:45 PM**	Paper Presenter	Masimukku Venkata Ramana	Stability of Partially Visible Solutions of Fractional Differential Equations

LACANA - The International Conference - Schedule

Venue 1: Auditorium				
Date	**Time**	**Type**	**Speaker**	**Topic**
15-03-2024	**09:30 AM - 10:30 AM**	Plenary	Dr.V. Kannan SRM University, Amaravathi.	The Dynamics of Contraction Maps on the Real Line
15-03-2024	**10:45 AM - 11:45 AM**	Keynote	Dr. Ambikasaran IIT, Madras	Physics informed Machine Learning for nonlinear PDEs
15-03-2024	**11:45 AM - 12:45 PM**	Keynote	Dr. Selvaganesan, IIST, Tiruvanantapuram	Fractional Order Systems for Cardio Vascular Systems
15-03-2024	**02:00 PM - 03:00 PM**	keynote	Dr. V. Ravindranath	Some widly use Statistical Models in Machine Learning Applications
15-03-2024	**03:15 PM - 04:15 PM**	keynote	Dr Usha Sridhar, University of Technology, Sydney, Australia	Survey and Perspectives of neural computing with super-human AI systems and related aspects
15-03-2024	**04:15 PM - 04:55 PM**	40 Min. Talk	Dr. I. Pallavi	Importance of Cyber Security in the Real World
15-03-2024	**06:00 PM - 07:15 PM**	**CULTURAL PROGRAM FOLLOWED BY DINNER**		

LACANA - The International Conference - Schedule

Venue 2: Mini Auditorium (B11-203)				
Date	**Time**	**Type**	**Speaker**	**Topic**
15-03-2024	**10:45 AM - 11:45 AM**	keynote	Dr. A. K. Nandakumaran IISc, Bangalore.	PDEs with L^1 source term, renormalised solutions and homogenization
15-03-2024	**11:45 AM - 12:25 PM**	40 Min. Talk	Dr. Vishnu Narayan Mishra IGNTU, Amarkantak, MP.	Quantitative Means of an Asymptotic Formula for a Family of Modified Linear Positive Operators
15-03-2024	**12:25 PM - 01:05 PM**	40 Min. Talk	Dr. Santosh B Joshi Walchand College of engineering, Sangli.	Recent Trends in Planar Harmonic Mappings
15-03-2024	**02:00 PM - 03:00 PM**	keynote	J Pdmanabham, NSTL, Visakhapatnam	Vibration Analysis and Condition Monitoring
15-03-2024	**03:00 PM - 03:40 PM**	40 Min. Talk	Dr.S. Purusotham VIT, Vellore.	A Hybrid Genetic Algorithm to the Multi-objective Multiple Travelling Salesman Problem
15-03-2024	**03:40 PM - 04:20 PM**	40 Min. Talk	Dr. Deena Sunil IGNTU, Amarkantak, MP.	Applications of Data in Quantam Computing
15-03-2024	**04:35 PM - 04:50 PM**	Paper Presenter	Dr. Satish Bhaurao Chavhan	
15-03-2024	**04:50 PM - 05:05 PM**	Paper Presenter	Nitesh Gangadharrao Ghungarwar	Philosophical Reflections on the Curiosity of the Universe
15-03-2024	**05:05 PM - 05:20 PM**	Paper Presenter	S. Padmavathi	Existence Results for Fuzzy Fractional Delay Differential Equations
15-03-2024	**05:20 PM - 05:35 PM**	Paper Presenter	Dr. G. V. Ramana, Aditya University	An RLC Series Circuit Excited by DC Source on Time Scales
15-03-2024	**05:35 PM - 05:50 PM**	Paper Presenter	Naveen Potnuru	ON LORENTZIAN PARA-KENMOTSU MANIFOLDS ADMITTING A QUARTER-SYMMETRIC NON-METRIC ξ - CONNECTION

LACANA - The International Conference - Schedule

Venue 3: CIVIL Seminar Hall (B8-301)				
Date	**Time**	**Type**	**Speaker**	**Topic**
15-03-2024	**10:45 AM - 11:45 AM**	keynote	Dr K.Gopikrishna, NIT Warangal	Collapse capacity and Probability of failure Assessment of RC buildings under earthquakes
15-03-2024	**11:45 AM - 12:25 PM**	40 Min. Talk	Dr G Paparao, GVPCE(A)	Shear strength equation in wide beams across the width
15-03-2024	**12:25 PM - 12:40 PM**	Paper Presenter	Y Harsha	Damage Detection of Simply Supported SteelBridge Structure Using Vibration Analysis
15-03-2024	**02:00 PM - 03:00 PM**	keynote	Dr.S. Madhavan, BARC, Visakhapatnam	Dynamic Response of Crystalline metels under impact-shock: Multiscale Modelling
15-03-2024	**03:00 PM - 04:00 PM**	Keynote	Dr. L. Giribabu, CSIR-IICT, Hyderabad	Dye-Sensitized Solar Cells: Past, Present and Future
15-03-2024	**04:15 PM - 04:55 PM**	40 Min. Talk	Dr. Abhay Kumar Mahanta, NSTL, Visakhapatnam	Fire explosives and Environmental Safety
15-03-2024	**04:55 PM - 05:10 PM**	Paper Presenter	V H S RAJESH CHALLA	Stability analysis of SIR Epidemic model under Temporary Cross-immunity with Delay
15-03-2024	**05:10 PM - 05:25 PM**	Paper Presenter	Arvind Dnyanoba Kanwate	Scherrer and Williamson-Hall (W-H) Analysis for Calculation of Average Crystallite Size of Nanoparticles
15-03-2024	**05:25 PM - 05:40 PM**	Paper Presenter	Dr Avinash Malladi	Design and Simulation Study of Disk Brake Wheel using Metal Additive Manufacturing Techniques
15-03-2024	**05:40 PM - 05:55 PM**	Paper Presenter	K.Surya Teja	IMPLEMENTATION OF LOW POWER ALU IN 45nm TECHNOLOGY

LACANA - The International Conference - Schedule

Venue 4: Mechanical Seminar Hall (B12-304)				
Date	**Time**	**Type**	**Speaker**	**Topic**
15-03-2024	**10:45 AM - 11:45 AM**	keynote	Dr. Varsha Gejji PUNE University	Exploring Fractional Differential Equations: A Journey into Fractional Ordered Dynamical Systems
15-03-2024	**11:45 AM - 12:45 AM**	keynote	Dr. Sachin Balekar, University of Hyderabad	Stability of Fractional Order Difference Equations
15-03-2024	**12:45 PM - 01:05 PM**	20 Min. Talk	Dr. S. P. Bhairat ICT, Mumbai	Chaos in Protein Aggregation: Experimental Evidence to Growth Rate Sensitivity and Bifurcation Analysis
15-03-2024	**02:00 PM - 02:40 PM**	40 Min. Talk	Dr.S. K. Tiwari SAKET, Ayodhya	TBA
15-03-2024	**02:40 PM - 03:20 PM**	40 Min. Talk	Dr.B.D. Karande Maharashtra Udayagiri Mahavidyalaya Latur	Fixed Point Theory on Fractional Order Differential Equations
15-03-2024	**03:20 PM - 04:00 PM**	40 Min. Talk	Dr. Om Prakash	Study of $(\theta, \Delta\theta)$-Cyclic Codes over the Finite Ring and its Extension
15-03-2024	**04:15 PM - 04:55PM**	40 Min. Talk	Dr. J. Krishnamurthy, NIT AP	Advanced Meterials for Soild- State refregiration Technoloby
15-03-2024	**04:55 PM - 05:35 PM**	40 Min. Talk	Dr.Lakshmi Narayan Mishra VIT, Vellore	Location, Separation and Approximation of Solutions to Nonlinear Generalized Hammerstein Integral Equations

LACANA - The International Conference - Schedule

Venue 5: EEE Seminar Hall (B0-202)				
Date	**Time**	**Type**	**Speaker**	**Topic**
15-03-2024	**10:45 AM - 11:25 AM**	40 Min. Talk	Mr. Shiju John, NSTL, Visakhapatnam	Dynamics of Autonomous Underwater Vehicles
15-03-2024	**11:25 AM - 12:10 PM**	40 min. Talk	Dr. K. Srikanth	Unravelling Mathematical Complexity : From Inverted Pendulums to Industrial Bioreactors
15-03-2024	**12:10 PM - 12:50 PM**	40 min. Talk	Dr.T.Ajeeth Prabhu	Microstructure visualization of shear Thickeninig fluids
15-03-2024	**02:00 PM - 02:20 PM**	20 Min. Talk	Dr. Y. Aditya, GMRIT	Dynamics of Anisotropic Renyi Holographic Dark Energy Model
15-03-2024	**02:20 PM - 02:35 PM**	20 Min. Talk	Dr. B. M. B.Krushna	Solvability of Iterative Systems of Riemann-Liouville Fractional Boundary Value Problems
15-03-2024	**02:35 PM - 02:50 PM**	Paper Presenter	Ch.Uma Swetha	AN OPTIMAL COST OF FUZZY TRANSPORTATION MODEL USING LR-PENTAGONAL FUZZY NUMBERS
15-03-2024	**02:50 PM - 03:05 PM**	Paper Presenter	P. Naveen	ON LORENTZIAN PARA-KENMOTSU MANIFOLDS ADMITTING A QUARTER-SYMMETRIC NON-METRIC ξ - CONNECTION
15-03-2024	**03:05 PM - 03:20 PM**	Paper Presenter	S.J.Chavhan	An Innovative Polynomial-Based Key Exchange Method in Non-Commutative Groups
15-03-2024	**03:20 PM - 03:35 PM**	Paper Presenter	Dr. Jaydeep Rangrao Wadkar	TBA
15-03-2024	**03:35 PM - 03:50 PM**	Paper Presenter	PASUNOORI SRINIVASULU	
15-03-2024	**03:50 PM - 04:05 PM**	Paper Presenter	S N R G Bharat Iragavarapu	Generalized Quasilinearization of MDE for PBVP through coupled lower and upper solutions of the IVP
15-03-2024	**04:20 PM - 04:35 PM**	Paper Presenter	Dr Narsimhulu Dunna	Effect of Viscosity on Shock Wave Propagation in Non-ideal Magnetogasdynamics Under The Influence of Heat Conduction and Radiation Heat Fluxes
15-03-2024	**04:35 PM - 04:50 PM**	Paper Presenter	Pandurang Dattu Kundgar	Method of Upper Lower Solutions for Nonlinear System of Hilfer Fractional Reaction-Diffusion Equations

LACANA - The International Conference - Schedule

Venue 1: Auditorium				
Date	**Time**	**Type**	**Speaker**	**Topic**
16-03-2024	09:30 AM - 11:30 AM	**Prof V Lakshmikantham Centenanry Birth Anniversiry Celebrations Chief Guest: Dr S Sundar, Director NIT Mizoram Guest of Honour: Dr M A Pathan, Aligarh Muslim University**		
16-03-2024	11:45 AM - 12:45 PM	Plenary	Dr.S.Sundar, Director, NIT, Mizoram	A shock-Capturing Meshless Geometric Conservations Weighted Least Square Method for Solving Shallow Water Equations
16-03-2024	03:30 PM - 04:30 PM	**Valedictory**		

LACANA - The International Conference - Schedule

Venue 2: Mini Auditorium (B11-203)				
Date	**Time**	**Type**	**Speaker**	**Topic**
16-03-2024	11:45 AM - 12:45 PM	Keynote	Dr. K.Ramji Former Vice Chancellor, Dr B.R. Ambedkar University, Srikakulam. HOD, Mechanical Enginerering, Andhra University.	VEHICLE DYNAMICS
16-03-2024	02:00 PM - 02:15 PM	Paper Presenter	Divya Kumari G	Stability analysis of SIR Epidemic model under Vaccination coverage with Time delay on Susceptible individuals
16-03-2024	02:15 PM - 02:30 PM	Paper Presenter	Yogesh Muley	An Analysis of Periodic Motion Using Fractional Calculus
16-03-2024	02:30 PM - 02:45 PM	Paper Presenter	N. Kanakayya	Uniqueness of solutions to higher order differential equations with nonhomogeneous integral boundary conditions
16-03-2024	02:45 PM - 03:00 PM	Paper Presenter	Kanaka Maha Lakshmi	STABILITYANALYSIS OF EPIDEMIC MODEL WITHEQUALBIRTH AND DEATHRATES

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Venue 3: CIVIL Seminar Hall (B8-301)				
Date	**Time**	**Type**	**Speaker**	**Topic**
16-03-2024	**11:45 AM - 12:25 PM**	40 Min. Talk	Dr.A.Seshagiri Rao, IIPE, Visakhapatnam	Simulation and Modelling of Waste Water Treatment Systems
16-03-2024	**12:25 AM - 01:05 PM**	40 Min. Talk	Dr. Kirtan Sahoo, NSTL, Visakhapatnam	Heat and Mass Flow in Battery Systems
16-03-2024	**02:00 PM - 02:40 PM**	40 Min. Talk	Dr Srinivas Gorla, GITAM University	Journey Through Intelligence: Exploring the Evolution from AI to Deep Learning
16-03-2024	**02:40 PM - 03:00 PM**	20 Min. Talk	Dr R. L. N. Pradeep, Vishnu Institute of Technology	Multicriteria Decision Making through Analytic Hierarchy Process
16-03-2024	**03:00 PM - 03:20 PM**	20 Min. Talk	Dr O V S R Vara Prasad, GVPCE(A)	Real Time Modelling and Analysis of Engineering Systems

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Venue 4: Mechanical Seminar Hall (B12-304)				
Date	**Time**	**Type**	**Speaker**	**Topic**
16-03-2024	**02:00 PM - 02:40 PM**	40 Min. Talk	Dr. P P S Keerthi	ANN modeling of laser micro drilling process
16-03-2024	**02:40 PM - 02:55 PM**	Paper Presenter	Srijani Dasgupta and Ishwarya Sampath	Dynamic Analysis of Single Row Ball Bearing
16-03-2024	**02:55 PM - 03:10 PM**	Paper Presenter	Yuva Sai Keerthan and Jangati Swati Murugan	Dynamic Analysis of Turbocharger Rotor-Bearing System Under different operating conditions

PLENARY SPEAKERS

Multidisciplinary Interactions in Interplanetary Mission Design

V. Adimurthy

Former Associate Director, Vikram Sarabhai Space Centre
Indian Space Research Organisation

The infinite glory and beauty of the earth and space are a source of perennial curiosity and inspiration to humanity over the ages. This cosmic panorama of nature has led us to pursue outstanding scientific and technological innovations and also to diverse interpretations through art, literature, and management. The emergence and inspiration of the scientific spirit from the lives of leading thinkers and scientists are briefly described. The unforgiving complexity of space missions and nonlinear interactions of a multitude of engineering disciplines are discussed. With the path-breaking background of our Chandrayaan and Mangalyaan missions, the exciting future possibilities of space exploration in understanding the infinitude of the universe are projected. For the future missions to Mars involving landers, rovers and sample return experiments, the most important development needed is efficient aero-assist technology for descent. Despite the apparently harsh environment of Venus atmosphere, this planet offers excellent opportunities for atmospheric dynamics studies, and ballooning experiments to study super wind dynamics. There are also several exciting possibilities with regard to the outer planetary giants. However, increased space activities lead us to new issues, like the need to manage the detrimental effects of space debris. It is also recognized that there is a small but definite probability of large near-Earth asteroids (NEAs) impacting our planet. Today's technology is mature enough for formulating suitable mitigation measures to avert a NEA impact catastrophe should such a need arise. This talk gives an overview of some of these exciting future technologies and scientific possibilities. These challenges are sure to inspire and occupy new generations of Indian students, scientists, engineers, educators, legal experts, and administrators.

A Shock-capturing Meshless Geometric Conservation Weighted Least Square Method for Solving Shallow Water Equations

S. Sundar, D. Satyaprasad and Soumendra Nath Kuiry

Indian Institute of Technology Madras, Chennai, India

The shallow water equations are numerically solved to simulate free surface flows in two-dimension (2D). The convective flux term in the shallow water equations needs to be discretized using a Riemann solver to capture shocks and discontinuity for certain flow situations such as hydraulic jump, dam-break wave propagation or bore wave propagation. The approximate Riemann solver can capture shocks and is popular for studying open channel flow problems with the traditional mesh-based methods. However, meshless methods can work on structured and unstructured grids and even for points irregularly distributed over

a computational domain. Moreover, approximate Riemann solvers is not reported to be implemented within the framework of meshless methods for solving the shallow water equations. Therefore, we have proposed a numerical method, namely, a shock-capturing meshless solver for the shallow water equations for simulating 2D flows on a highly variable topography even in the presence of shocks and discontinuity. The HLL (Harten-Lax-Van Leer) Riemann solver in the proposed meshless method is used to evaluate convective flux. The spatial derivatives in the shallow water equations and the reconstruction of conservative variables to calculate flux terms are computed using a geometric conservation weighted least square (GC-WLS) approximation. The proposed meshless method is tested for a range of numerically challenging problems and laboratory experiments.

The Dynamics of Contraction maps on the Real line

V. Kannan

Department of Mathematics
SRM University, Andhra Pradesh, India

Two trajectories are said to be of the same "orbit type" if there is an increasing bijection from R to R that takes one to the other, There are uncountably many order types in general, even for contraction maps. With the usual notation of "itineraries", here are seven among them:

1. LLRRLLRR...
2. LRRLRRLRR...
3. RLLRLLRLL...
4. LLLL...
5. RRRR...
6. LRLRLR...
7. CCCC...

We prove that every eventual orbit type is "equivalent to" exactly one of them. Here "equivalent to" means "forcing and forced by". This result is later used to prove that there are exactly eight packages of eventual orbit types for contraction maps on R.

200 kVA, Roof top- Solar wind Hybrid Renewable Energy System with Battery Storage

Sastry V Vedula

Department of Electrical and Electronics Engineering
Gayatri Vidya Parishad College of Engineering(A) Visakhapatnam

Starting from the concept of a DC Micro grid towards a futuristic DC home, where one may not need AC power. The DC micro grid is contrasted with an AC micro grid with utility in the back plane. Solar - wind hybrid power systems with peak power kVAs such as 100 kVA, 50 kVA and 50 kVA on the roof tops of the three engineering colleges: i.e., GVP College of Engineering (co- education), GVP College of Engineering for Women (Madhhurawada) and GVP Technical School at Rushikonda Campus. The details of such systems built over here as early as in 2016 with partial funding from MNRE (Ministry for New and Renewable Energy, New Delhi. are given in this seminar presentation.

KEYNOTE SPEAKERS

PDEs with L^1 Source term, Renormalized Solutions and Homogenization*

A. K. Nandakumaran

Department of Mathematics
Indian Institute of Science, Bangalore- 560 012, India
Email: nands@iisc.ac.in

In PDEs, when the source term is weak, for example when $f \in L^1$, the standard weak formulation is not applicable. We give a brief introduction to the concept of renormalized solution when $f \in L^1$. In the later part of the talk, we present some recent results from the theory of homegenization with weak L^1 data in an oscillatory domain.

A Journey of Fixed Point Theory and Nonlinear Differential Equations

Bapurao C. Dhage

Kasubai, Gurukul Colony, Ahmedpur-413 515, Dist. Latur,
Maharashtra, India

The two fields of fixed point theory and nonlinear differential equations are closely related to each other and one is responsible for the multitude development of another. So, the above topic is an important and major part of the subject of nonlinear analysis. The reason and the origin of the initiation of fixed point theory lies in the nonlinear differential equations, however, fixed point theory is immensely used in the existence and qualitative study of nonlinear differential equations. It is now known that the three classical fixed point theorems of Banach, Schauder, and Tarski are three pillars and the fourth hybrid fixed point theorems of Krasnoselskii and Dhage form the fourth pillar of the building of nonlinear analysis. All the above fixed point theorems have been widely used in the theory of nonlinear differential equations under different situations and conditions on the nonlinearities involved in the equations, that is, for different types of nonlinear differential equations.

In the present keynote address, we discuss some basic fixed-point theorems of algebra, analysis and topology from their original form to the latest generalized form applicable to nonlinear differential and integral equations. The merits and demerits of each fixed point theorem will be discussed and compared with other fixed point theorems with regard to applications to nonlinear differential and integral equations. Next, we give a brief history of hybrid fixed point theory and discuss some fundamental hybrid fixed point theorems with regard to applications to nonlinear hybrid differential and integral equations. Next, a brief survey of hybrid fixed point theory will be taken and some latest hybrid fixed point theorems will be mentioned with applications to nonlinear hybrid differential and integral equations. Finally, the address ends with a few open problems in both the areas of hybrid fixed point theory and nonlinear hybrid differential and integral equations.

Set Differential Equations: An overview, perspectives and Recent Developments

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The study of Set Differential Equations (SDEs) has connections to Fuzzy Differential Equations, multivalued differential equations, control problems and many others. Our focus centres on SDEs formulated through Hukuhara and Bede-Gal derivatives, as well as formulations involving their corresponding support functions. These formulations are in the setting of $Kc(R^n)$ (the semi-linear space of all compact, convex subsets of the Euclidean space R^n), endowed with Hausdorff metric. In this talk, we navigate through the landscape of this intriguing study, shedding light on some of the pivotal contributions, and evolution of ideas and indicate afew open problems in certain directions.

Numerical Solution of System of Fractional Diffusion Equations

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This paper attempts to obtain the numerical solution to the system of initial boundary value problem. This also discusses the stability as well as convergence of the method. At the end test problem is discussed for the verification of the same.

Comparison of Harder Stability and Rus Stability of Mann Iteration Procedure

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We study the stability of Mann iteration procedure in two directions, namely one due to Harder and the second one due to Rus with respect to a map $T:K \to K$ where K is a nonempty closed convex subset of a normed linear space X that satisfies the condition: there exist $\delta \in (0,1)$ and $L \geq 0$ such that

$$\|Tx - Ty\| \leq \delta\|x - y\| + L\|x - Tx\| \text{ for all } x, y \in K.$$

Also, we show that the Mann iteration procedure is stable in the sense of Rus may not imply that it is stable in the sense of Harder for weak contraction maps. Further, we compare and study the equivalence of these two stabilities and provide examples to illustrate our results.

Location, Separation and Approximation of Solutions to Nonlinear Generalized Hammerstein Integral Equations

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From Newton's method, we construct a Newton-type iterative method that allows studying a class of nonlinear generalized Hammerstein-type integral equations. This method is reduced to Newton's method if the kernel of the integral equation is separable and, unlike Newton's method, can be applied to approximate a solution if the kernel is nonseparable. In addition, from an analysis of the global convergence of the method, we can locate and separate solutions of the nonlinear generalized Hammerstein-type integral equations involved. For this study of global convergence, we use auxiliary functions and obtain restricted global convergence domains that are usually balls.

Keywords: Newton-type method, Global convergence, Hammerstein integral equation, Fixed point theorem, Measure of Noncompactness
2020 Mathematics Subject Classification: 45M10, 45D05, 26A33, 65R20

Dye-Sensitized Solar Cells: Past, Present and Future

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The research on Dye-Sensitized Solar Cells (DSSCs) has intensified across the globe due to their easy-to-fabricate and environmentally benign. 1 DSSC was first invented by Gratzel and Co-workers with a device efficiency of 7.1% using Ru(II) polypyridyl complex as sensitizers, TiO 2 as semiconductor and I - /I 3 - as redox couple. 2 For a couple of decades, the device efficiency has crossed 14% under AM 1.5G. This has been achieved majorly due to the re-design of various components of the device and also new fabrication aspects have been adopted. 3 Despite showing double-digit efficiency the technology has not been completely commercialized majorly due to the device's stability. The advantage of DSSC is that it works efficiently under artificial light conditions that will open small applications for this technology. Recently, a new concept has been introduced that DSSC under artificial/low-light conditions and the concept will be useful for the application of the Internet of Things (IoT) and there it opens new areas of applications. DSSC has crossed device efficiency of 35% using metal-free organic dyes with Cu(I/II) redox couple. 4 The detailed evolution of DSSC technology for the past couple of decades will be presented.

Recent Developments In The Applications Of Mathematics To Computer Science

P. S. Avadhani

Professor of Computer Science & Former Principal of College of Engineering,
Andhra University & Former Director, IIIT, Agartala

The exponential growth in computer science opened new areas of research with mathematics providing the basic building block. Artificial intelligence, big-data analytics, bio-informatics, 3D printing, and drones are some of the recent advance ments in that direction. We have already witnessed the applications of partitions in ATMs, primality testing in cyber security, evidence graphs in cyber forensics, algebraic geometry in computer graphics and many more. The main idea of this invited talk is to present some of these applications of mathematics which are being used extensively in many day-to-day applications.

Hyper Geometric Type Extended Bivariate Zeta Function and Lidstone Polynomials

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Based on the generalized extended beta function, we shall introduce and study a new hypergeometric-type extended zeta function together with related integral representations, differential relations, sums, and series expansions. Our hypergeometric type extended zeta function involves several known zeta functions including the Riemann, Hurwitz, Hurwitz-Lerch, and Barnes zeta functions as particular cases. Since our results of Hermite- Bernoulli polynomials can be connected to Riemann zeta functions, Bernoulli polynomials, Hermite number, Bernoulli-Hermite numbers and (p,q)-hypergeometric-Bernoulli polynomials, we can apply a connection of Lidstone polynomial and Bernoulli polynomials to obtain new results and connections of Hermite-Bernoulli polynomials and Lidstone polynomials.

Practical Hydraulics-Applications in Free Surface and Pressurized Flows

Dr Prasanth Reddy

IIT Kharagpur, India

This lecture discusses practical and innovative topics in open channel flow and closed pressure conduits with the details of hydraulic modeling. Topics such as unsteady flows in channels and pipes will be discussed. The topics include stormwater drains, compound channels, and sediment transport. Sub-topics are specific energy applications in open channels, losses in pipes and open channels, and unsteady flows in open channels and pipes. The development of numerical methods for the solutions to these problems will be outlined along with how boundary conditions are implemented. Finally, the lecture will also give a brief introduction to free available tools for practical unsteady flow computations.

Physics-informed Machine Learning for Nonlinear PDEs

Sivaram Ambikasaran

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With the rapid explosion in available data and computing power, coupled with advances in machine learning, solving nonlinear PDE using Machine Learning is becoming an attractive alternative to conventional techniques. In this talk, we will give an overview of Physics Informed Machine Learning and discuss the recent progress in this evolving area.

A Review on the Mathematical Tools in the Evolution of Cryptography

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Cryptography is a science developed for the protection of information and secure communication, through cryptosystems based on complex Mathematics. The security and efficiency aspects of a cryptosystem are the main reasons for the evolution of cryptography, from primitive cryptography to quantum cryptography. This review is focused on the exposition of the underlying Mathematics that is fundamental to symmetric cryptosystems, public key cryptosystems, like RSA cryptosystems, cryptosystems with Deffie Hellman protocol, cryptosystems with elliptic curves and the cryptosystems with Lattice-based protocols that withstand quantum attacks.

Keywords: Cryptography, Public key cryptosystems.

Behavior of Soil: Significance of Considering Non-Linearity

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The complexity of soil's mechanical response makes it a challenging material for engineers to work with, as it depends on numerous governing parameters. Despite this complexity, engineers often simplify soil behavior by assuming linearity when designing structures, which has resulted in various failures of foundations and structures subsequently. This work emphasizes the importance of accounting for soil non-linearity in real-world scenarios, especially under dynamic loads.

The presentation begins by examining field cases that illustrate the range of soil behaviors under dynamic loading, including linear, non-linear, and plastic responses. It then briefly discusses various physical modeling techniques for assessing soil dynamics. A comprehensive set of dynamic soil properties, including liquefaction potential, will be introduced. Following this, the presentation will demonstrate the application of these soil properties through case studies in three different real-world scenarios. This approach, termed "Seismic Requalification," will be applied to a public building and a major bridge situated in India's most active seismic zone, as well as a nuclear power plant in southern India. Overall, the objective of the lecture is to provide insight into the state-of-the-art understanding of soil non-linearity and its implications for critical infrastructure design under dynamic loading conditions.

A Spectrum of Intelligent Tourist Destinations Ranking Information System

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In recent years tourism industry has grown on world worldwide scale. The growth of the tourism industry depends upon primary components such as an image of the destination, the satisfaction of tourists at the destination, perceived value of the services tourist loyalty and products at the destination, etc. Since the ancient period Indian, culture, crafts, knowledge, philosophy, devotion, and arts have grown, and been publicised by various visitors due to that, attracting admirers and devotees from different parts of the world. Varanasi is famous for culture and spirituality in India, it is also known as the city of Lord Shiva, and it has a bulging place in India's tourism industry. The Indian culture is deeply immersed in the history of Varanasi, which is why Varanasi has become the hub of tourist attraction. The city of Varanasi, situated in Uttar Pradesh, expands to the Ganges. As per the historical and mythological description of Varanasi, it is the ancient living city of the Earth, as well as the capital of culture and spirituality in India. Being the city of Lord Shiva, it is a hub of tourists and devotees from all over the world benefitting not only the Hindus but also attracting the Buddhists from Asian countries. The present talk is focused on the design and development of an intelligent tourist destination ranking information system, and the system reflects the influence of criteria for the selection of tourist destinations based on destination image features. The system is designed to capture tourists' perception as per Soft Computing Intelligent Information System that may be influential in redesigning the decision-making criterion of tourists about the prefixed tourist destinations.

Dynamic Response of Crystalline Metals under Impact-Shock: Multi-scale Modelling

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Dynamic-response of materials at high strain rates is being investigated using Molecular Dynamics (MD) to understand the underlying physical phenomena in a material under impact-shock-loading conditions. MD is used to obtain shock and fracture parameters data at the atomic length (10-100 nm) and time (1-100 ns) scales for the materials under high strain rates. This work is focused on the single-crystal and bi-crystals of metals and their response to high velocity impact. The highlight of this work is the application of the multi-scale method to obtain fracture parameters in single and polycrystalline metals. The multi-scale method involves sequential execution of (a) molecular dynamics, (b) multi-parameter optimization to obtain material-dependent fracture parameters and (c) one-dimensional hydrodynamic simulations to calculate the spall-fracture parameters. The problems investigated are: (i) impact-shock propagation in single and bi-crystals, and (ii) multi-scale method for single and bi-crystals, to calculate the spall fracture parameters. The results using the multi-scale method match experimental results of dynamic spall strength with an accuracy up to 95%.

Artificial Neural Network Approach to Singular Matrix Differential Systems

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It is an established fact that Initial Value Problems and Boundary Value Problems play an important role in many fields of human activity. Linear and Nonlinear Singular Matrix Differential systems which are also called Semi-State, Degenerate, Descriptor, Constrained, and Differential Algebraic Systems. These systems can be used to describe the behavior of systems in which a sudden change in structure or parameter values occurs. It is of great interest to solve the Initial Value Problems and Boundary Value Problems associated with Linear and Nonlinear Singular Matrix Differential Systems. Finding accurate Numerical Solutions for these problems is important since closed-form solutions will not exist because of their nonlinear nature. This paper introduces an adaptive neural network approach for solving Singular Matrix Differential Systems by using supervised learning. In the ANN approach selecting suitable Activation functions and Optimization algorithms is vital and is problem specific. Supervised learning is based on local error estimates and backpropagation. In this paper, by exploring the various choices of activating functions and Optimization Algorithms solutions of the Linear and Nonlinear Singular Matrix Differential Systems are obtained by minimizing the Loss function. The approach is substantiated by the examples.

Keywords: Singular Systems, Differential Equations, ANN, Activation functions, Neural Network

(This is joint work with Praveen Kumar U M, Department of Mathematics, Rayalasema University, Kurnool-518007(A.P))

Exploring Fractional Differential Equations: A Journey into Fractional Ordered Dynamical Systems

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Fractional calculus, a generalization of classical calculus, has capti- vated the minds of mathematicians and scientists for centuries. While the foundations of this field were laid as early as the late 17th century, it is only in recent decades that we have witnessed a resurgence of interest and groundbreaking developments in this area. The study of fractional calcu- lus has proven to be invaluable in describing and modeling the behavior of complex systems that exhibit memory effects and hereditary properties. In this talk, we will introduce the notions of fractional order derivative/integral and their calculus. We will review existence and uniqueness theorems for fractional differential equations along with their analysis. In recent decades, Fractional Order Dynamical Systems (FODS) have gained significant attention. We will illustrate, through some examples, how FODS differ from their integer-order counterparts. One striking difference is that two distinct trajectories in FODS can intersect each other within a finite time frame. Further, we will present some intriguing results about FODS and chaos, highlighting their potential for applications to real-world problems. Finally, we will discuss some analytical results about FODS, including the stable manifold theorem.

Survey and Perspectives of Neural Computing With Super-human AI Systems and Related Aspects

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To obtain good applicability and generalization ability of a (neural) model, it is important to build into the (neural) network as much knowledge about the problem as possible. This requires adjusting the connections, learning, number of layers, weights and so on to optimize the architecture also. In the background of the Hopfield model with Hebbian learning in a linear associative memory network with randomised synaptic weights, the role of inhibitory neurons in memory retrieval is discussed. I will review and explore some recent research areas of massive interest. The so-called innovation into bio-fabrication or 3D bioprinting, that is "Creating whole organs in a lab" is in progress and is enticing many companies. New tools are being built using tactile and auditory stimuli to make coding accessible to visually impaired researchers, closing the gap. One such idea is CuriO, which has a multi-sensory approach to programming. Image manipulation and integrity are posing a rising issue for publishers of research papers. Advances in machine learning could be the key to detecting and repairing such issues. Some of the world's big data breaches & hacks and most common passwords are also visited from a mathematical point of view. It is also urgent to identify the role of ChatGPT-generated resources by students in high school and University assessments. Regarding gender disparities in research, evidence was found worldwide after the pandemic that, female academics' publishing rate has been down relative to men's and still has recovered. More serious is the case with people of colour. Some generic directions and human-inclusive AI techniques are discussed in this context.

Nonlinear Vibration Features for Damage Assessment in Concrete Structures

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The traditional system identification techniques using modal analysis assume the system as linear which may not be valid in the case of structures exhibiting breathing crack behavior during the initial damage stage. Detection of nonlinearity in the case of weakly nonlinear structures is essential for the detection of incipient damages as well as the initiation- and propagation- of cracks. Time series analysis techniques are found to be effective in extracting the nonlinear features for the characterization of system dynamics for timely fore-warning of failures. Reinforced concrete (RC) structures respond in nonlinear manner under dynamic loads even at low levels of vibration. This causes softening in concrete which may results in the unstable vibration. By considering the nonlinearity, the effects of amplitude of vibration on the modal characteristics can be used to extract damage sensitive features. For effectively identifying the nonlinear damage features in RC structures from the frequency spectral information, an appropriate vibration testing procedure is formulated in the present study. Damage features are evaluated from the changes in vibration amplitude with frequency at different damage levels under various type of excitation and their force levels. Damage indicators based on basic signal statistics and nonlinearity in vibration responses are evaluated. Using the phase plane information obtained from various damage scenarios, nonlinear damage indices have been formulated. Another significant nonlinear damage feature has been identified by the occurrence of higher harmonics observed by analysing the spectral density functions obtained from the frequency domain decomposition. One of the promising features is the changes in phase space topology (derived from time-series information) for the detection of nonlinearity in dynamic responses of a damaged structure. In this paper, phase space topology is constructed using the acceleration-velocity-deflection responses obtained from controlled force excitation to a reinforced concrete bridge girder-deck structure at different stages of damage. Phase space trajectories from the intact and damaged structure (at different levels) are used to evaluate damage progression from the formulated dissimilarity methods. The integrity of the structure including the initial stage of damage is assessed based on dissimilarity features formulated by the change in the dynamics of the nonlinear system and determined through time-series based statistical shape analysis. The distortion in phase space topology is found to be an efficient nonlinear damage index feature and is very sensitive to damages of low magnitude, distinguishing the structural nonlinearity from material one. It can thus be an effective tool in identifying the damage initiation through nonlinear features which form the base for structural health monitoring of weakly nonlinear civil infrastructures.

40 MINUTE TALKS

Arbitrary Order Nonlinear Random Differential Equations

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In this paper, we proved the existence and attractivity result of the solution for first, second and fractional order nonlinear random ordinary differential equation in separable Banach space using caratheodory and Lipschitz condition. The existence of extremal solutions is also proved under caratheodory and certain monotonicity condition. The results are illustrated with the aid of examples.

Keywords: Fractional derivative and integration, fixed point theorem, fractional differential equation, nonlinear ordinary differential equation, the existence of a solution to ordinary differential equation.

AMS (MOS) Subject Classification: 26A33, 37C25, 54H25, 55M20, 58C30, 34K37, 34A34, 34A12

Fixed point Theory on Fractional Order Differential Equations

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In this Presentation, we discuss the existence theory on Fractional Order Equations in Banach Algebras under some mixed generalized Lipschitz and Caratheodory Condition. Moreover; we show that solutions of this equation are locally attractive. Our main tool is a Fixed Point Theorem. The existence theorems for extremal Solutions are also proved under Certain Monotonicity Conditions. Our results are illustrated by an example.

Keywords: Fractional Order Equation, Fixed Point Theorem, Locally Attractive and Extremal Solutions, Banach Algebras

AMS Classifications: 34K10, 34A12, 46B50

Applications of Data in Quantum Computing

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With the exponential growth in computing power with data, quantum computing is getting ready for its close up. Quantum computers are ideally suited to solving complex problems, which are hard for classical computers but are easy to factor on a quantum computer. Such an advancement creates a world of opportunities, across almost every aspect of modern life. In fact, Google has recently made headlines proclaiming the achievement of quantum supremacy, where its computers can perform a task that a conventional computer can't. IBM is also making noise about their supercomputers, which are blazingly fast. However, we often wonder what these things actually do and what are its real-world applications? In this article, we are going to talk about some of the top quantum computing applications in the real world.

Shear Strength Equation in Wide Beams across the Width

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A test programme of six reinforced concrete wide beams in two series together with their strength prediction is reported in this paper. Each series had different parameters of wide beams. In each series, specimens had identical in geometry, flexural reinforcement, amount of shear reinforcement per metre length of beam, material properties and test details. The only variable is vertical stirrup leg spacing across the beam width. The number of vertical stirrup legs in the beams across the width varied from zero to six. The shear strength of normal beams, with well distributed shear reinforcement along the length could be safely predicted by the IS: 456-2000 code. No guidance is available in any code for multiple stirrup legs across width in wide beams. Based on the experimental results, an equation was proposed to predict the shear strength of the wide beams with multiple stirrup legs. The accuracy of the proposed shear strength equation was evaluated against the experimental results; the predictions were conservative.

Results on Weak Contractions via w-distances

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In this paper, we deal with some innovative concepts of (τ, α)-weak contractive type mappings and establish several fixed point results without relying on conditions essential in prior works.

Keywords: Complete metric space, b-metric space, weak contraction, fixed point, $((\tau, \alpha))$- weak contractions.
2020 Mathematics subject classifications (AMS): Primary 47H10, Secondary 54H25.

Computational Approaches to Time-Fractional Partial Differential Equations

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The non-local nature of fractional derivatives and integrals has proven useful for modeling real-world problems more accurately. These techniques have successfully been applied to model memory effects in various phenomena. In this work, we describe computationally efficient numerical methods for solving partial differential equations involving fractional derivatives in time. In particular, we address the time-fractional advection-dispersion equation, the time-fractional wave-diffusion equation, and the multi-term time-fractional wave-diffusion equation as illustrative examples. Our paper analyzes the stability and convergence of these new methods and demonstrates their effectiveness. A comparison of numerical errors with existing methods in the literature highlights that the new methods offer improved accuracy.

Keywords: time-fractional partial differential equations, time-fractional wave-diffusion equation, Riemann-Liouville fractional derivative, Caputo fractional derivative, stability, convergence, numerical method.

MSC 2010: 26A33, 35L05, 35R11, 65M22, 65M12, 65M15

Advance Material for Solid-State Refrigeration Technology

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Multiferroics are materials possessing more than one ferroic order, has also been mentioned as possible systems to enhance the caloric effects by taking advantage of coupling between long-range ferroic orders. For example, tuning the magnetic order with electric field or modification of ferroelectricity with magnetic field is called magnetoelectric (ME) coupling has received renewed research interest due to its importance in various applications. Solid-state refrigeration (SSR) has evolved as a climate-friendly technology in the past few decades. While comparing with the conventional vapor-based compression refrigeration technology, SSR eliminates the hazardous chemicals, compressors, and evaporators. The solid-state magnetic refrigeration has the potential to reduce energy use by 30% and requires no refrigerant. SSR uses caloric effects, i.e., temperature changes due to external stimuli like magnetic, electric, or mechanical influences. Magnetocaloric (MCE-magnetic field), electrocaloric (ECE-electric field), elastocaloric (ELCE-mechanical stress) and barocaloric (pressure) effects correspond to these stimuli. The caloric effects are characterized by the entropy change in an isothermal process (ΔS_{iso}) and by the temperature change in an adiabatic process (ΔT_{ad}) upon external field variation. In addition to refrigeration, multiferroic materials with ME coupling are also used in memory devices, sensors and actuators, catalytic activities and have some biological applications. In this presentation it will be discussed the importance of ME coupling in multiferroics with the illustration of some examples to enhance the total adiabatic temperature changes required for the low-temperature applications.

Unravelling Mathematical Complexity: From Inverted Pendulums to Industrial Bioreactors

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This work is a culmination of over two decades of research on complex dynamic systems starting from a simple inverted pendulum control problem which is the basis for studies on stability and control as a basic model. A simple inverted pendulum with two degrees of freedom is the test bed in the family of inverted pendulums which is used for stringent testing studies on control parameters in classical control. As the complexity is intensified from single to double, triple and quadruple inverted pendulums, the control problem becomes more difficult in terms of stability as the parameters influencing the system dynamics increases manifold. With six degrees of freedom and the governing mathematical equations being represented in unified format as a matrix, the controller design would be of immense importance. Adding an extra dimension of time delay would further make the problem difficult. Extrapolating and extending the ideas developed for the system analysis from the test bed of inverted pendulum, there were some studies on various plant models on dynamics of under actuated ships to bioreactors of various orders which were analysed using differential equations formulated from Newtonian mechanics and or Euler-Lagrangian Equations which emphasise the need for better understanding of the fundamental need for reducing the higher order equations of all these systems to a lower first order system by decoupling the dependencies to have better control on the system under observation. This work gives a brief glimpse of the underlying methodologies involved in reducing the complexities involved.

Keywords: Complex Dynamic Systems, Time delays, differential equations, inverted pendulums, ships, bioreactors.
Subject classification: 93C95-Application models in control theory, 93C05-Linear systems in control theory, 93C10-Nonlinear systems in control theory, 93C15-Control systems governed by ordinary differential equations

Sustainability Evaluation of Application of Graphene in Machining Inconel718 and Ti6AL4V Alloys

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Novel materials, such as heat-resistant super alloys encompassing iron, nickel, and titanium alloys, are engineered for extreme environments. However, their inherent difficulty in machining presents challenges. Dry machining, limited in its applicability, often necessitates flood cooling, albeit posing environmental and health hazards. While Minimum Quantity

Lubrication (MQL) exhibits improvement, the adoption of nanofluids remains limited. This study targets sustainable machining of these formidable materials through two approaches: the development of self-lubricating cutting tools and the application of MQL with graphene-based cutting fluids.

The research entails fabricating self-lubricating cutting tool inserts infused with graphene nanopowder within cemented carbide tools. Additionally, graphene-based cutting fluids are synthesized with varying concentrations. Comprehensive evaluation is performed for both methodologies in machining Nickel and Titanium alloys by measuring cutting forces, temperature, tool wear, and surface roughness across a spectrum of cutting speeds. The identification of the optimal machining environment is based on these performance metrics.

Environmental sustainability is a driving force, aiming to minimize energy consumption throughout the manufacturing process to reduce carbon emissions. Despite extensive research on machining Nickel and Titanium alloys, environmental considerations have been largely overlooked. The study seeks to rectify this by investigating the energy-related environmental implications of machining these alloys, proposing strategies to mitigate their carbon footprint. A holistic carbon footprint analysis, encompassing all stages from production to disposal, helped in determination of the most environmentally sustainable machining practices.

In parallel, economic viability is crucial for industrial adoption. Thus, an economic analysis is conducted to identify the most cost-effective machining strategies. By integrating machining performance evaluation, environmental impact assessment, and economic analysis, the study aims to ascertain the best sustainability machining environment for Nickel and Titanium alloys.

Existence of Uniform Statistical Convergence for Integration and Differentiation of Series of Functions

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A statistical convergence was introduced in connection with problems of series of functions. The concept of statistical convergence is directly connected to the convergence of such statistical characteristics as the mean and standard deviation. In this paper, we introduce a uniform statistical convergence for Integration and Differentiation of Series of Functions of real-valued functions. Also, examine the validity of some theorems on Uniform convergence of series of real-valued functions and uniform statistical convergence of series of real-valued functions.

Keywords: Series of functions, Uniform Convergence, Statistical Convergence, Uniform Statistical Convergence

Study of (θ, Δ_θ)-Cyclic Codes over the Finite Ring and its Extension

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Let F_q be the finite field of order $q = p^m$ where p is a prime and $m > 1$ is a positive integer. In this talk, we focus our discussion on the structure of (θ, Δ_θ)-cyclic codes over the ring R and the mixed alphabets F_qR where $R = F_q[u]/\langle u^2 - u\rangle$. Here, we use the decomposition of the ring R to analyze the structural properties of these codes and determine their generator polynomials. Further, we introduce the concept of the Gray map over R and F_qR to find the Gray images of F_qR-linear (θ, Δ_θ)-cyclic codes over F_q. Finally, using our established results, we are able to produce several optimal and MDS codes.

Keywords: Finite field, Linear codes, Skew polynomial rings, (θ, Δ_θ)-cyclic codes, Gray map
Mathematics Subject Classification:12Y05, 16Z05, 94B05, 94B35, 94B15.

Effect of Viscosity on Shock Wave Propagation in Non-ideal Magnetogasdynamics under the Influence of Heat Conduction and Radiation Heat Fluxes

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In this paper, we study the effect of artificial viscosity on flow variables of shock wave problems in a magnetized environment of the generalised dusty gas equation of state (EoS) under the influence of heat conduction and radiation heat fluxes. Shock is assumed to be strong and propagate through a medium in a power law. The dusty gas medium combines natural gas and uniformly distributed micro-size solid particles. The flow's equilibrium conditions are expected to be maintained in an optically thick gray gas model, and radiation is assumed to be of the diffusion type. The governing equations of one-dimensional compressible unsteady viscous magnetohydrodynamic flow are non-linear system of one- dimensional partial differential equations (PDEs) with quasi-hyperbolic type. With the aid of appropriate similarity transformations, these equations can be transformed into to a system of ordinary differential equations (ODEs). The solution of the considered problem is obtained numerically using MATLAB software and the effect of the Cowling number, the viscosity parameter on shock propagation is studied in detail. The results show

that for various values of non-idealness parameters in the presence of viscosity, the flow variables have distinct features in generalised dusty gas EoS with the effect of heat conduction and radiation heat fluxes. It is evident from the present work that artificial viscosity removes all discontinuities of the flow parameters and gives a smooth profile compared to the results obtained from the literature. Also, the influence of heat conduction and radiation heat fluxes on the flow variables with and without artificial viscosity is analysed. Also, the complete flow field depends upon the magnitude of the artificial viscosity parameter. All the analysis is presented pictorially in this paper. The work aims to better understand shock wave behavior in a magnetised environment of generalised dusty gas (EoS) with viscosity under the influence of heat conduction and radiation heat fluxes.

Keywords: Shock wave, Rankine-Hugoniot conditions, Magnetohydrodynamics, Artificial viscosity, Non-ideal dusty gas, Radiation heat flux, Numerical simulation.
Mathematics Subject Classification: 76L05, 76M60, 76M20

Fractional Order CVS Model with Baroreflex Control

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The Cardiovascular System (CVS) is an intricate and essential part of human physiology which maintains oxygen transport, blood flow and homeostasis throughout the body. Understanding the dynamics and regulation of the CVS is important in clinical medicine, biomedical research and healthcare innovation. Experimentation with the human body to understand physiology is a challenging research area in the modern world. The mechanisms postulated to explain the human system can be easily studied using mathematical expressions in computer simulation due to the extremely complex structure of the human system. These mathematical representations involve creating dynamical equations and computational. In this work, the Cardiovascular System (CVS) is modelled as lumped parameter using the pressure voltage analogy. The viscoelastic property is taken into consideration by including fractionality to the Windkessel and geometrical model of CVS. The fractionality in the model is obtained using different heuristic optimization algorithms. Baroreflex dysfunction is one of the common causes associated with the CVS. The buffering capability and baroreflex gain influences large variation in blood pressure for short term control. For regulating the blood pressure, an integrated fractional order CVS model with the baroreflex control is proposed to study the complex interactions between autonomic nervous system and CVS. Also, the proposed model is studied for different abnormality conditions like orthostatic intolerance, haemorrhage, atherosclerosis and arterial stiffness.

Recent Trends in Planar Harmonic Mappings

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In the present lecture, we aim at presenting systematically developments of planar harmonic mappings in complex planes. The Planar harmonic mapping was introduced by Clunie and Sheil-Small in 1984 and gave new directions for research. After this, seminal papers, many developments took place, such as introducing subclasses. We have first given an introduction and then presented our research work in this lecture.

A Hybrid Genetic Algorithm to the Multi-objective Multiple Travelling Salesman Problem

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The travelling salesman problem (TSP) and its variants have been studied extensively due to its wide range of real-world applications, yet there are challenges in providing efficient algorithms to deal with some of its variants. The multiple travelling salesman problems, (MTSP) is the generalization of TSP, aims to determine m-shortest routes for 'm' salesmen all of which start and end at a depot city such that they cover all the n-cities without intervening. This may lead to a disproportionate distribution of the number of cities to be covered by each salesman. This study deals with multiple objectives which include the minimization of service time, distance travelled, and the workload on the salesperson. The optimal solution to this problem may not be possible at one point as it involves a trade-off between two objectives. A hybrid Genetic Algorithm (GA) is proposed to obtain the efficient route plan for the m-salesmen. Firstly, the n-cities are proportionately distributed to m salesmen. Next, the initial solution is generated with the help of a simple greedy search algorithm fed into GA. Further, GA is designed by inducting different operators such as crossover, mutation and reverse operators to provide efficient Pareto routes. The experiments are carried out on different data sets, which are derived from the TSPLIB. The performance of GATS is compared with different genetic approaches and simulation results show that the proposed GATS obtained improved solutions on some of the benchmark instances.

Keywords: Travelling Salesman Problem; Multiple Travelling Salesman Problem; Genetic Algorithm.

On Componentwise Linearity of Edge Ideals of Weighted Oriented Graphs

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The study of ideals having linear resolution has paid lots of attention among researchers in Commutative Algebra. These ideals behave nicely and computationally simple than others. One of the remarkable results due to Eagon-Reiner says that the Stanley-Reisner ideal of a simplicial complex is Cohen-Macaulay if and only if its Alexander dual has a linear resolution. Componentwise linear ideals, which is a large class of ideals including the class of ideals having linear resolution, have become popular in the theory of Commutative Algebra since they enjoy various nice properties and algebraic interpretation. In 1990, Fr¨oberg established a significant result stating that the edge ideal of a simple graph G, denoted as I(G), has a linear resolution (or componentwise linear) if and only if the complement graph of G is chordal. In this talk, we discuss the componentwise linearity of edge ideals of weighted oriented graphs (WOGs). It is an open question that which weighted oriented graphs are componentwise linear? Can we characterize them combinatorially? We cannot simply generalize or extend characterizations of componentwise linear simple graphs to WOGs because edge ideals of WOGs are not square-free, not equigenerated and depend on the orientation and weights. We showed various combinatorial characterizations for the componentwise linearity of WOGs. This is a joint work with Manohar Kumar and Kamalesh Saha.

Quantitative Means of an Asymptotic Formula for a Family of Modified Linear Positive Operator

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The key goal of this research article is to deal with the properties of the approximation family of linear positive operators, which is defined by Aratini O. Our main purpose is to obtain the Asymptotic formula for the proposed operators as well as quantitative means of Voronovskaya type theorem and GrussVoronovskaya theorem is established. Some graphical and numerical examples are given in support of the operators' convergence to the function.

Keywords: Szász-Mirakjan operators, Voronovskaya type theorem, Asymptotic formula
AMS subject classifications: 41A25, 41A36, 47A58.

Automated Surface Roughness Classification using Deep Learning and Robot Vision

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A robot vision system is a technology that enables automatic inspection by using image processing. Robot vision inspection may be defined as a process of extracting, characterizing, and interpreting information from images of a three-dimensional world and comparing it with a known standard to generate a decision as an output. In this work, deep learning algorithms are trained through the transfer learning approach for classifying the images of the machined surfaces into four classes A, B, C, and D. The data set is prepared by capturing 8 pictures of each sample machined with different speed, feed, and depth of cut combinations as per the full factorial design of the experiments. A major portion of this data is used for training the algorithm, while the remaining data is used for validating and testing the algorithm. The surface roughness parameter of the samples is observed and analysed using a robot vision system. The robot vision system includes a 6 DoF Mitsubishi Articulated robot and the Cognex In-Sight 1.3 MP camera. The performance of data learning models was compared based on the average accuracy of the models. The developed system could be useful in analyzing the surface finish aspects of the machined components in industries with a high production rate and, hence, reducing labor costs, inspection cycle time, operator errors, and multiple setups, thereby increasing productivity and decreasing the overall production cost.

A Numerical Scheme to a Nonlinear Mckendrick-Von Foerster Equation with Diffusion

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An implicit finite difference scheme is presented to approximate the solution to the McKendrick-Von Foerster equation with diffusion (M-V-D). The notions of upper, lower solutions are introduced and used effectively with the aid of discrete maximum principle to study the well-posedness, and stability of the numerical scheme. A relation between the numerical solutions to the M-V-D and the steady-state problem is established.

On Componentwise Linearity of Edge Ideals of Weighted Oriented Graphs

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The study of ideals having linear resolution has paid lots of attention among researchers in Commutative Algebra. These ideals behave nicely and computationally simple than others. One of the remarkable results due to Eagon-Reiner says that the Stanley-Reisner ideal of a simplicial complex is Cohen-Macaulay if and only if its Alexander dual has a linear resolution. Componentwise linear ideals, which is a large class of ideals including the class of ideals having linear resolution, have become popular in the theory of Commutative Algebra since they enjoy various nice properties and algebraic interpretation. In 1990, Fr¨oberg established a significant result stating that the edge ideal of a simple graph G, denoted as I(G), has a linear resolution (or componentwise linear) if and only if the complement graph of G is chordal. In this talk, we discuss the componentwise linearity of edge ideals of weighted oriented graphs (WOGs). It is an open question that which weighted oriented graphs are componentwise linear? Can we characterize them combinatorially? We cannot simply generalize or extend characterizations of componentwise linear simple graphs to WOGs because edge ideals of WOGs are not square-free, not equigenerated and depend on the orientation and weights. We showed various combinatorial characterizations for the componentwise linearity of WOGs. This is a joint work with Manohar Kumar and Kamalesh Saha.

Turbulent Heat Transfer and Pressure Drop haracteristics of Al_2O_3-Ethylene glycol and Al_2O_3-Water based Nanofluid in the Microfin Helically Coiled Tube: Numerical Study

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Augmentation in the heat transfer rate of the working fluid in the tube can be achieved by modification of tubes, by improving the thermos physical properties of working fluid and changing the direction of fluid flow. For this, in this study, the numerical heat transfer and pressure drop characteristics of Al_2O_3–water and Al_2O_3–EG nano fluids in the micro-fin helically coiled tubes are studied by using ANSYS FlUENT 19.2. In this case, the straight tube can be changed into a helical coiled tube, thereby, heat transfer is increased due to the centrifugal effect caused by the curvature of the tube. The realizable k−ε turbulence with enhanced wall treatment model was applied. Effects of solid volume fraction of nanofluid, Reynolds number, fin number, and coil diameter on Nusselt number and pressure drop are discussed. It is found that the heat transfer coefficient and pressure drop increase with the rise of solid volume fraction, and Reynolds number of nanofluid. Also, the comparison of the tubes and nano fluids are presented in this study.

ANN Modeling of Laser Micro Drillin Process

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Laser micromachining(LMM) is a thermal energy based unconventional machining process that removes material by ablation. The versatility of the process makes it suitable to machine different materials. LMM finds its applications mainly in industries like aerospace, automobile, biomedical application etc. Nitinol, is a super alloy of Titanium and Nickel, and is unique for its properties like super elasticity and shape memory. Nitinol is a good choice for bio medical applications owing to its biocompatibility. The thermal dependent shape memory feature of Nitinol makes it difficult to machine by conventional means. In this work, Laser Micro drilling on Nitinol is performed using laser spot diameter, feed rate and sheet thickness as the process parameters. The quality of hole characteristics like Heat Affected Zone (HAZ) and Hole circularity for the drilled holes is investigated. Artificial Neural Networks are used to train the data and to predict the values of Heat Affected zone and hole circularity. Regression Analysis is also performed to obtain the relation between the parameters and the performance measures. The developed equation can be further used for the optimization of the process. understand the influence of the parameters on the Heat affected zone and the circularity of the drilled holes.

The Math behind the Mind: Mastering Calculus and Linear Algebra for Artificial Intelligence

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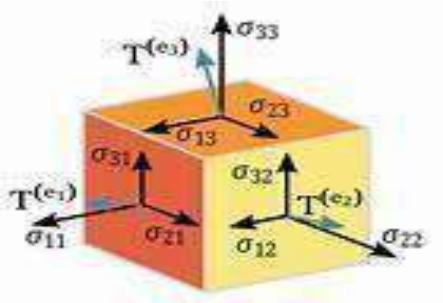
In the ever-evolving landscape of artificial intelligence (AI), mathematical foundations play a pivotal role. This abstract delves into the critical components—Calculus and Linear Algebra—that form the bedrock of AI algorithms and models.

1. Linear Algebra: The Backbone of AI

Linear Algebra serves as the workhorse for AI practitioners, enabling them to manipulate data efficiently. Key concepts include:

- Scalars: Fundamental single numbers (real or natural).
- Vectors: Ordered lists of numbers representing points in space.
- Matrices: Two-dimensional arrays with indexed elements.
- Eigenvectors & Eigen values: Special vectors and their scalar counterparts.
- Singular Value Decomposition: Matrix factorization with diverse applications.
- Principal Component Analysis (PCA): Dimensionality reduction technique



2. Calculus: Navigating Change and Optimization

- Calculus provides tools to understand changes, approximations, and optimization. Key concepts include:
- Derivatives: Rules (product, chain, etc.) and hyperbolic derivatives.
- Partial Derivatives: Essential for multi-dimensional functions.
- Integration: Fundamental for areas under curves and probability distributions.

3. Deep Neural Networks: Where Math Meets AI

Deep neural networks, the heart of modern AI, rely heavily on these mathematical foundations. We explore theoretical directions, exemplary results, and open problems relatedto deep neural networks. Join us in unravelling the Math behind the Mind, empowering AI enthusiasts and researchersto master these mathematical tools and unlock the potential of artificial intelligence.

20 MINUTE TALKS

Subspace Clustering

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The data in most of the real-world applications is abundant and voluminous both in terms of objects and attributes. Such data need to be analyzed using suitable data mining technique for decision making. Cluster Analysis is one of the important functionality of data mining which groups similar data objects that share interesting patterns formed by combinations of attributes. Estimating the distance between objects in terms of complete set of attributes restricts the patterns to be defined in terms of all attributes whether they really characterize the group of data objects constituting a cluster. Hence, the conventional clustering methods fail to detect meaningful clusters in high-dimensional feature space as the distances between data objects become insignificant due to irrelevant attributes contributing noise to the distance estimation.

Dimensionality reduction is applied as a preprocessing step to eliminate irrelevant and redundant attributes before applying conventional clustering methods in the reduced feature space referred to as subspace. This preprocessing approach is limited to identifying clusters of data objects that share interesting patterns in the reduced feature space which should be common for all possible groups. However, most of the high dimensional datasets contain different groups of data objects that share interesting patterns with varied combinations of attributes defined in multiple subspaces. In other words, an attribute may be irrelevant while defining the shared pattern of a cluster while the same attribute may be essential in defining the shared pattern of another cluster. A subspace is defined as a specific subset of attributes relevant for identifying groups of similar objects in a perspective. Subspace clustering is the process of identifying clusters in all possible subspaces of a given dataset. A subspace cluster is denoted with two dimensions <O, A> representing the set of objects grouped into the cluster and the set of attributes defining the subspace respectively.

Privacy Preserving Data Publishing with Multiple Sensitive Attributes

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Data publishing plays an important role in the evaluation of economic models, identification of social trends and pursuit of the state-of-the-art in various fields. Privacy preservation has become one of the major issues in data publishing. It is desirable to preserve the individual's privacy on the released content without reducing the utility rate. Many of the existing privacy

preserving data publishing (PPDP) models concentrate on a single sensitive attribute. It is necessary to concentrate on PPDP with multiple sensitive attributes to obtain more meaningful associations from the published data. This session presents three different PPDP models with multiple sensitive attributes namely "**KC_i-slice"**, "**Novel KC_i-slice"**, "**Optimal KC_i-slice"** and "**Distributed KC_i –slice"** to overcome the limitations of the existing PPDP models.

These models are implemented based on the concepts of attribute sensitiveness and slicing. The proposed "**KC_i-slice**" model finishes the data publishing process in two phases. It imposes the necessary privacy constraints on sensitive attributes. KC_i-slice model uses a "**Semantic l-diversity**" algorithm to perform bucketization of the tuples in order to prevent similarity attacks. KC_i-slice model imposes the privacy constraints on all the sensitive values of the buckets and also finds the correlation among the sensitive attributes, to partition the sensitive attributes into different sensitive tables using slicing technique. The proposed "**Novel KC_i-slice**" model uses a new bucketization technique named as "**Enhanced semantic l-diversity**" technique to overcome the drawbacks of Semantic l-diversity. It is necessary to obtain various privacy levels on different sensitive values of a sensitive attribute. The previous two models give high priority even to low sensitive values of a sensitive attribute. Because of this, it is not possible to get optimal results from the published data. The proposed "**Optimal KC_i-slice"** model imposes various privacy thresholds on the sensitive values based on their sensitiveness. The Optimal KC_i-slice model prioritizes the sensitiveness of the sensitive values of a high threshold sensitive attribute while forming the buckets. All these three models works only on centralized data bases. A new model called as "**Distributed KC_i –slice"** implemented for the distributed databases. Adult dataset from the University of California Irwin (UCI) machine learning repository is used to test all four proposed models.

Keywords: Privacy preserving, Slicing, Data publishing, Bucketization.

Advancements in Facial Expression Recognition: From Psychology to Technology

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Facial Expression Recognition (FER) has been a significant research area since the early nineties, initially explored by psychologists to understand various facial emotions, including anger, disgust, fear, happiness, sadness, and surprise. This research identified Facial Action Units (FAUs), which are specific sets of facial muscle movements representing different expressions and forming the basis of the Facial Action Coding System (FACS). FAUs provide a standardized framework for expression recognition. In recent years, FER has gained traction due to advancements in related fields such as machine learning, computer vision, image processing, and cognitive science. However, achieving high accuracy in FER remains challenging, prompting ongoing dynamic investigations. FER finds applications across diverse fields, including next-generation human-computer interfaces (HCI), behavioural science, video games, robotics, psychology, music and television systems, telecommunications, animations, automobile safety, and educational software, enabling more efficient resource utilization. Facial features are typically categorized into appearance-based and geometric-based feature extraction methods in emotion recognition systems. Appearance-based techniques involve applying filters like Gabor wavelets to the entire face or specific

regions, as well as utilizing methods such as Local Ternary Pattern (LTP), Local Binary Pattern (LBP), Histograms of Oriented Gradients (HOG), Discrete Wavelet Transform (DWT), and Stationary Wavelet Transform (SWT) for feature extraction. On the other hand, geometric-based approaches focus on the location and shape of facial components such as eyes, eyebrows, nose, and mouth for feature representation.

Multicriteria Decision Making through Analytic Hierarchy Process

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Multicriteria Decision Making (MCDM) plays a vital role in numerous domains where decisions must consider multiple conflicting criteria. MCDM involves evaluating alternative courses of action against multiple criteria to determine the most suitable option. This process is often encountered in business, engineering, healthcare, and environmental management, among other fields. Traditional decision-making approaches often fail to capture the inherent complexity and interdependencies among criteria, leading to suboptimal outcomes. In contrast, MCDM methods aim to systematically analyze and prioritize alternatives based on a set of predefined criteria.

The Analytic Hierarchy Process (AHP) is a widely adopted method for tackling MCDM problems due to its ability to handle complex decision scenarios. The AHP, introduced by Thomas L. Saaty, is a structured technique for decomposing complex decision problems into a hierarchical structure of criteria and alternatives. AHP facilitates pairwise comparisons between elements at each level of the hierarchy to derive preference weights, reflecting the relative importance of criteria and alternatives. These weights are then aggregated to generate a comprehensive ranking of alternatives, aiding decision-makers in selecting the most favorable option.

The versatility of AHP enables its application across diverse decision contexts, ranging from project selection and resource allocation to supplier evaluation and strategic planning. Moreover, its intuitive framework and robust mathematical foundation make AHP accessible to practitioners and researchers alike. However, challenges such as subjective judgments, inconsistency in pairwise comparisons, and scalability issues necessitate careful consideration and validation in real-world applications. Future research may focus on advancing AHP methodologies, addressing practical challenges, and exploring innovative applications in emerging domains to further enhance decision-making capabilities.

PBVP of an Integro Differential Equation

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In this paper we first develop the method of generalized quasilinearization for initial value problem of an integro differential equation and then use it to develop quasilinearization for the PBVP of the integro differential equation by using the coupled lower and upper solutions of the considered problem.

Flow Characteristics of Micropolar Nanofluid Stuffed Between Viscous Nanofluids: Three-Layer Flow

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An analysis of the micropolar nanofluid stuffed between purely viscous nanofluid in the upper and lower regions is presented. The channel walls are maintained at two different constant temperatures. The transport properties of the fluids in all the three regions are assumed to be constant. Exact analytical solutions are found and are evaluated numerically for the linear velocity, microrotation velocity and temperature. The influence of material parameter ($0 \leq 2.0 \leq K$), solid volume fraction ($0 \leq \varphi \leq 0.5$), Eckert number ($0 \leq Ec \leq 2.0$), cell rotation viscosity and various nanoparticles on the velocity, microrotation velocity, temperature, Nusselt values, skin friction and mass flow rate are presented in graphical and tabular form. It is found that the material parameter and solid volume fraction reduce the velocity and temperature. Eckert number develops the temperature field. The cell rotation viscosity reduces the velocity for any values of material parameter. The Nusselt values are not much varied for any of the nanoparticles. The mass flow rate decreases with increasing the concentration of nanoparticles and with material parameters.

Gaussian Process Regression-Based Expert System for Predicting Remaining Useful Life in Steel and Composite Structures

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Leveraging recent advancements in sensor technology, this study presents an expert system for comprehensive structural health monitoring. The expert system utilizes various data points, including crack location, depth, first three natural frequencies, fatigue stress, and remaining useful life, to train a Gaussian process regression algorithm. This trained algorithm effectively detects, localizes, and assesses crack severity, while also predicting the remaining useful life of steel and composite structures. Numerical modal analysis of diverse cracked steel and composite plates under fixed-free and fixed-fixed conditions determines the first three natural frequencies. Experimental validation is achieved through impact hammer tests on these plates with varying crack configurations under the same conditions. The difference between experimental and numerical modal analyses is a mere 9.6%. Similarly, numerical fatigue analysis is conducted to estimate fatigue stress and remaining useful life for various cracked plates under both fixed-free and fixed-fixed conditions. Experimental validation for fatigue stress involves measuring it in cracked plates using a strain gauge circuit during induced random vibration from an electrodynamic shaker identical to the one used in numerical analysis. The deviation between experimental and numerical fatigue stress analyses is just 4.31%. This comprehensive dataset, encompassing crack information, natural frequencies, fatigue stress, and remaining useful life obtained from both numerical and experimental analyses, is used to train the Gaussian process regression based expert system developed using

Python programming. The system's performance is evaluated using an R-squared score, achieving an impressive 98.7, demonstrating its high efficiency. Further thorough evaluation through experimental analysis on steel and composite structures confirms its accuracy, with an average error percentage of only 5.82% in predicting crack location, severity assessment, and remaininguseful life estimation.

Keywords: Composite plate, natural frequencies, fatigue stress, crack detection, crack localization, crack severity, residual life estimation, expert system, Gaussian process regression algorithm

Quasilinearization for Impulsive Fractional Differential Equations

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My work focuses on the Impulsive Fractional Differential Equations with fixed moments of impulse using Caputo fractional derivative and the existence and uniqueness of solutions was studied through the technique of quasilinearization. The method of quasilinearization was extended which has been established for hybrid Caputo fractional differential equation to a set up where the function under consideration is a sum of two functions, one satisfying convexity like condition and the other satisfying concavity like condition. This method has been extended to obtain the unique solution of the periodic boundary value problem (PBVP) for hybrid Caputo fractional differential equation. This has been attained by the solutions of linear initial value problems (IVPs) of the corresponding PBVP. The generalized quasilinearization technique was enhanced for an initial value problem of hybrid Caputo fractional differential equation by using coupled lower and upper solution of type I. In order to develop this method the lower solution was fixed.

Keywords: Quasilinearization, Impulsive Differential Equations, Fractional Differential Equations.

AMS (MOS) subject classification: 34K07, 34A08

A Note on Solving Cubics in the Context of an Equation-Oriented Approach for Process Optimization

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The cubic equations of state (CEOS) are widely used in the chemical and petroleum industries for modelling, Simulation and Process Optimization. The handling of the solutions of CEOS in Equation Oriented (EO) optimization for calculation of the relevant

thermodynamic properties in Vapor-Liquid equilibria calculations is the focus of the present work. An analysis about the calculation of the appropriate phase root of the cubic equation of state is presented and applied to the Peng-Robinson equation of state to bring out the reliability of the proposed method.

Keywords: Cubic equation of state, root finding, cubic function, vapor-liquid, calculation phases

Research Integrity

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The process of conducting research is both an art and a science, requiring a delicate balance of creativity, methodology, and perseverance. This presentation explores the essential components of effective research, from formulating research questions to disseminating findings. Through a comprehensive examination of research design, data collection methods, analysis techniques, and ethical considerations, attendees will gain valuable insights into the intricacies of the research process. Practical tips, real-world examples, and best practices will equip participants with the tools and knowledge needed to embark on successful research endeavours in any discipline. Whether embarking on their interest for pursuing research or seeking to refine their existing skills, this presentation offers invaluable guidance for researchers at all levels.

Existence of Solutions for Abstract Nonlinear Integrodifferential EquationVia S-Iteration Method

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In this paper, we study the existence, uniqueness and other properties of solutions of abstract nonlinear Volterra integrodifferential equation with nonlocal condition. The tool employed in the analysis is based on application of S-iteration method. S-iteration method has equally important contribution to study various properties such as dependence on initial data, closeness of solutions and dependence on parameters and functions involved therein.

Keywords: Existence, Continuous dependence, Closeness, Parameters, abstract integrodifferential equation; Normal S- iterative method

Fixed Point Theorems on B_4 – Metric Spaces

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Recently, B_4 - metric spaces are introduced as a generalization of metric spaces. We introduce new contractive mappings on B_4- metric spaces and investigate relationships among them. Examples and counter examples are provided as and when necessary addition, we obtain fixed point theorems for self-m B_4-metric spaces.

Keywords: Diameter, Fixed point theorem, Periodic point, S-metric space, B_4- metric space.

Graph Neural Networks (GNNs) for NLP

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Graphs have been used as an intermediate representation for text to solve Natural language processing problems. Graphs are found to be effective in capturing the semantic, syntactic, temporal and relational structure between words. Traditional graph based approaches are rule based and were effective for tasks such as keyword extraction and extractive summarization. Since the advent of deep learning techniques, Researchers have developed Graph Neural Networks (GNNs) that operate on graph-structured text. GNNs analyse graph-structured text at three levels, graph level, node level and edge level. Graph neural networks are more effective than traditional rule based approaches as they process multiple combinations of all the sub components of a graph to uncover hidden patters which are overlooked in rule based approaches. This paper provides an overview of various types of Graph Neural Networks and the key parameters involved.

Advancing Truth Verification in Digital Media: A Novel Approach Leveraging AWD-LSTM and Multi-Stage Transfer Learning

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In the era of digital communication, distinguishing between truth and falsehood has become increasingly complex due to the rapid dissemination of information across online platforms. This presentation introduces an innovative approach to addressing the challenge of fake news detection by employing a sophisticated AWD-LSTM network model enhanced through multi-stage transfer learning. Unlike conventional methods that heavily depend on the availability of user engagement data, the proposed work incorporates a strategy that emphasizes the utilization of auxiliary information, such as user comments, to assess the veracity of online content swiftly and accurately. By integrating user responses as critical input, the proposed model offers a dynamic solution to verify information authenticity, significantly reducing reliance on extensive labeled datasets. Through comprehensive evaluation on benchmark datasets including SemEval-2017 Task 8 and PHEME, the proposed method demonstrates superior performance in accuracy and efficiency compared to existing models. This presentation will delve into the architecture of the proposed system, highlighting its capability to adapt to the evolving nature of fake news and its potential to enhance the reliability of digital media.

The Effect of Vibration Produced from Underground Explosives: Implications for Structural Integrity

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The detonation of explosives in underwater operations generates significant vibrations that can have profound effects on both the surrounding geological structures and the environment. This study aims to investigate the characteristics of these vibrations, their propagation through various geological formations, and their potential impacts on nearby structures and ecosystems. Through comprehensive field measurements the vibration patterns generated by underground explosions will be analysed in terms of frequency, amplitude, and duration. The influence of factors such as explosive charge size, depth of water, and geological composition on the resulting vibrations will be examined to understand the mechanisms driving their propagation. Furthermore, the study will assess the structural response of nearby buildings,infrastructure. Advanced structural analysis techniques can be employed to evaluate the risk of damage or structural fatigue caused by repeated exposure to explosive-induced vibrations. Experiments were carried out in a 15m ×12m tank with the water depth of 10 m, under different explosive quantities (5g to 45g at the interval of 5g), and detonation depths of 2m below the water. The shock wave dynamic response of experiment models was measured by configuring sensors of acceleration.

Keywords: Underwater explosion, RCC building, Dynamic response, FFT analyser.

Dynamics of Anisotropic Renyi Holographic Dark Energy Model

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In the background of the Saez-Ballester (Physics Letters A: 113, 467, 1986) theory of gravitation, the manuscript presents the study of Rényi holographic dark energy determined through interaction and non-interaction in the anisotropic and spatially homogeneous Bianchi type-I space-time. I determine both non-interacting and interacting dark energy models by considering a correlation between the metric potentials to solve the field equations of the model. This results in a dynamical deceleration parameter which demonstrates a shift in the cosmic rate of acceleration from deceleration to acceleration, with a redshift z change that is compatible with observations. Despite assuming several values to parameters de close to -1 at z=0 (the present epoch) and in agreement with the most recent observations, the equation of state parameter de for the two Rényi holographic dark energy models display substantially different dynamic behaviour. Next, I discovered that the squared sound speed, vs2, is negative, implying instability against perturbations. The de-de' plane is constructed to investigate the evolution of the models' EoS parameter, which turned out to be in a freezing zone. As should be the case in an expanding universe, the strong energy conditions of the models are violated. Our models include the Chaplygin gas, CDM limit, and are inclined towards the steady-state model. Statefinders (r,s), and r-q planes were also examined.

Keywords: Saez-Ballester theory of gravity, Bianchi type model, Renyi holographic dark energy, Cosmology, Dark energy

PAPER PRESENTERS

Bifurcation Analysis and Chaos Control in New Fractional-order Dynamical System

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This study explores the dynamical behavior of a novel fractional-order system, affirming chaotic dynamics within the commensurate fractional-order range of 0.92 to 1. Numerical simulations reveal a one-scroll chaotic attractor in three-dimensional space, supported by Lyapunov exponent computations for each fractional order. Additionally, Kaplan-Yorke dimension analysis confirms the system's strange attractor with fractal dimension. Investigation into equilibrium points assesses system stability. Bifurcation analysis showcases the system's rich dynamics under parameter and fractional order variations, while control strategies are employed to stabilize chaotic behavior. The study sheds light on the intricate dynamics of fractional-order systems and their sensitivity to parameter changes and order variations.

Keywords: Bifurcation; State feedback control; Lyapunov exponent; Stability; Dynamical systems

Exploring Chaotic Behavior in Financial Systems via Fractional Order Dynamics

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This study delves into the dynamics of a fractional-order financial system, uncovering its propensity for chaos within a fractional-order. The demonstration of chaotic behavior is confirmed through numerical analyses, including phase portraits, bifurcation diagrams, and Lyapunov exponents. It offers a detailed understanding of the complex behaviour of fractional-order systems and how they react to changes in parameters and fractional orders.

Keywords: Mathematical Modelling, Bifurcation Analysis, Stability Analysis, Chaos, Lyapunov Exponents.

Solution of Partial Differential Equation Using Adomian Decomposition Method

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The Adomian Decomposition Method is one of the earliest Semi-analytic and numeric algorithms for finding approximate solutions to initial value problems for Partial Differential Equations. George Adomian introduced the Adomian Decomposition Method in the 1970s and it developed from the 1970s to 1990s to solve different kinds of differential equations and stochastic equations. Adomian Decomposition Method is one of the best methods and has a proper accuracy. In this paper, we solve some first-order and second-order Partial Differential Equations using the Adomian Decomposition Method and we compare solutions with some existing methods. It is observed that the solution obtained by the Adomian Decomposition Method is very easy.

Keywords: Adomian Decomposition Method, initial value problem, Partial Differential Equation, linear Partial Differential Equation, non-homogeneous Partial Differential Equation.

The Heat and Mass Transfer of a Hydro-Magnetic Free Convective Flow over an Infinite Vertical Plate Inserted in a Porous Medium

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The consideration for the effects of viscous dissipation and heat absorption, the current paper aims to analyse the effects of heat and mass transfer on an unsteady dimensional laminar mixed convective boundary layer flow of viscous, incompressible, electrically conducting fluid, alongside a vertical plate with suction, embedded in porous medium, in the presence of transverse magnetic field. The behaviour of temperature, concentration, and velocity has been investigated for changes within the governing parameters. In the presence of a uniform magnetic field and heat absorption, the issue that takes into account the impact of viscous dissipation on the flow of an incompressible viscous fluid over an infinite vertical flat plate embedded in a porous medium was successfully formulated. The formulae for the velocity, temperature, and concentration were determined by mathematically solving the governing equations of the flow field using the finite difference method.

Keywords: Porous Medium, Fractional derivative, Heat conduction, Convective Flow, Vertical Plate

Philosophical Reflections on the Curiosity of the Universe

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In 1930, Albert Einstein discussed the philosophical implications of his general theory of relativity for cosmology. In 1983, Stephen Hawking examined the philosophical implications of the cosmological constant and its role in cosmology. In 1986, Barrow and Tipler discussed the philosophical concept of the anthropic principle and its significance for understanding the universe. In 1997, Lee Smolin's book offers a philosophical exploration of cosmology, discussing the implications of the universe's evolution and the role of natural selection in cosmological theories. Many authors have discussed their philosophical and scientific approaches to cosmology. After examining their studies in the field of cosmology, one question arose in my mind: "Why are we curious about the Universe?" The answer to this question, which we obtained through a philosophical approach with some scientific evidence, is that we are a part of the Universe. We have correlated humans as part of the Earth through a comparative study of PruthviDhatu (Bones and muscles), Aap (liquid), Tej (heat), and Wayu (gases) in our body. Through these observations and evidences, we come to the conclusion that we are part of the Earth, and knowing that Earth is part of the Universe implies that we are part of the Universe. This article elaborates on how we are part of the universe.

Method of Upper Lower Solutions for Nonlinear System of Hilfer Fractional Reaction-Diffusion Equations

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The goal of this study is to provide a monotone approach to demonstrate the existence and uniqueness of the solution to the Hilfer fractional reaction diffusion equations nonlinear coupled system with beginning and boundary conditions. The Hilfer fractional reaction diffusion finite system was also covered by the approach.

Keywords: Hilfer fractional derivative; Eigenfunction; Quasimonotone method; Mixed quasimonotone method

Mathematics Subject Classification (2020):26A48,26A33, 34A08

Numerical Investigation on Stress Behavioural Characteristics Prediction of Perforated Plates

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In the realm of structural engineering, thin-walled plates and panels serve as indispensable components for both straight-ward and intricate configurations. The plates featuring various cutout shapes play a pivot role, particularly in aerospace structures. Understanding the impact of the cutout on load-bearing capacity and stress concentration is paramount in designing complex structures. The part of the research work carried out in this paper delves into the stress analysis of plates with various central cutouts subjected to uniform pressure throughout. The primary objective of this research work is to showcase the precision and simplicity inherent in the present numerical solution for the stress analysis of composite plates. The investigation considers a spectrum of factors such as cutout geometry, material properties, and fibre angles. A critical facet of the investigation lies in comparing the results derived from the previously available literature with those obtained through analytical solution, experimental and finite element methods, aiming to validate the accuracy and efficacy of the present model. These considerations mirror the diverse scenarios encountered in the practical applications ensuring the applicability and robustness of the numerical model. The presented solution emerges not only as an accurate means of stress analysis but also as a testament to the potential for simplifying the intricate processes involved in designing and optimizing composite structures with central cutouts.

Keywords: Ansys solver, Composites, Deformations, Finite Element Method, Plate, Stress analysis.

Design and Simulation Study of Disk Brake Wheel using Metal Additive Manufacturing Techniques

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In the ever-evolving landscape of automotive technology, the optimization of critical components such as disk brake wheels is imperative for enhancing performance, durability, and overall safety. This research focuses on the integration of Metal Additive Manufacturing (MAM) techniques in the design and simulation of disk brake wheels to achieve superior mechanical properties and thermal performance. The study commences with a comprehensive exploration of various metal additive manufacturing processes, evaluating their suitability for fabricating disk brake wheels. A judicious selection of materials is crucial for meeting the

stringent requirements of load-bearing capacity, thermal conductivity, and wear resistance inherent in braking systems. The simulation study involves the evaluation of thermal dissipation, stress distribution, and deformation characteristics during braking events. Finite Element Analysis (FEA) is employed to simulate real-world scenarios, allowing for the identification of potential failure points and the refinement of the design accordingly. The research investigates the impact of various design parameters and manufacturing parameters on the performance of the disk brake wheel. The findings of this study contribute valuable insights into the feasibility and advantages of employing metal additive manufacturing techniques in the production of disk brake wheels. This research serves as a foundation for the integration of cutting-edge technologies in the automotive industry, fostering advancements in both design and manufacturing processes for critical safety components.

Keywords: Additive Manufacturing, LPBF, Disk brake, DMLS

Differential Geometry on Lorentzian Para-Kenmotsu Manifolds Admitting a Quarter-Symmetric Non-metric ξ -Connection

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In this article, we define and prove the existence of a quarter-symmetric nonmetric ξ-connection on a class of Lorentzian almost paracontact metric manifolds namely Lorentzian para-Kenmotsu (briefly LP-Kenmotsu) manifolds M_n. Further, we obtain a relation between the curvature tensor of an LP-Kenmotsu manifold with respect to the semi-symmetric non-metric ξ-connection and the Levi-Civita connection and also derived several interesting results. We have shown that the Lorentzian para-Kenmotsu manifold equipped with non-metric ξ-connection is an Einstein space-time, if it satisfies $R.S - R.S = 0$, where R and S are the curvature tensor and the Ricci tensor of M_n with respect to the non-metric ξ-connection $\hat{\nabla}$. At the end, we construct an example of a 4- dimensional Lorentzian para-Kenmotsu manifold admitting non-metric ξ-connection which verifies the results discussed in the present work.

Keywords: Lorentzian paracontact manifold, para-Kenmotsu manifolds, Non-metric ξ-connection, Levi-Civita connection, Curvature tensor, Einstein space time.
AMS Subject Classification: 53C25, 53D10, 53D15

Some Fixed Point Theorems for Contractive Mappings in an Euclidean Space R^n

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In this paper a couple of fixed point theorems for Banach and Kannan type contraction mappings are proved in an Euclidean space R^n via calculus method and using the max/mini

principle. It is shown that though our approach to Banach and Kannan mappings is different from the constructive one, however we are not far away from the usual method. Actually one can take an arbitrary point $x_0 \in R^n$and if we define a sequence $\{x_n\}$ of iterates of the mapping under consideration, and then it is shown that the sequence converges to a fixed point geometrically. Our abstract result is also illustrated with an example.

Dynamic Analysis of Single-Row Ball Bearing

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Ball bearings are the pillars for any mechanical rotary component. It acts as a support and load distributor. For this very reason, studies focus on improvising the properties of ball bearings, either by changing material, by design or by efficient manufacturing process. Stainless steel is the most common option for such components because of its high tensile strength and load-bearing capacities. This study focused on the design and simulation analysis of a single-row ball bearing in static and modal mode. The number of balls and the number of modes were taken to be the variable parameters for the overall simulation. A normal force on the outer race of the ball bearing was implemented for the static analysis. The maximum equivalent stress was found at Pressure 25MPa - 239.35 MPa in the ball bearing having six balls. The minimum equivalent stress was found at Pressure 20MPa - 128.66 MPa with the number of balls being ten. These results concluded that as the pressure on the ball bearing increased, the equivalent stress increased while the converse was true for the number of balls. The total deformation was analysed in the modal analysis and the maximum deformation was found to be in mode 9 - 171.01 units with a frequency of 46330 Hz and the number of balls being 10. The minimum deformation was found to be in mode 1 - 30.749 units with frequency 8843.9 Hz and number of balls being 6. As modes increased, the deformation increased and the same was true for the increase in the number of balls. In case of higher stress concentration, the ball bearing design offers an additional development potential and can be enhanced further by different design modifications.

Keywords: Model analysis, Static analysis, Tensile strength

Existence Results for Fuzzy Fractional Delay Differential Equations

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In this article, it is primarily focused on the existence and uniqueness of a fuzzy fractional delay differential equation (FFDE). By employing the Banach Contraction Principle, the result is established. The fractional derivatives are considered in the Atangana Baleanu sense. The continuous dependence on initial conditions of the FFDE is also studied.

Keywords: Fuzzy Fractional Delay Differential Equation, Banach Contraction Principle, Continuous dependence.

An Optimal Cost of Fuzzy Transportation Model Using LR-Pentagonal Fuzzy Numbers

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One well-known linear programming approach for networks is the fuzzy transportation algorithm. Issue that arises from frequent use of supply chains and logistics to lower the expenses. Because of unpredictable circumstances, the specific variables of a transportation problem may not always be known in real-life scenarios. This article discusses the best estimated solution to a unique kind of optimization model called the fuzzy transportation model, which uses LR-pentagonal fuzzy numbers to represent supply, demand, and costs. Given this, there are two distinct methods used to solve the fuzzy transportation model: 1) Four transportation solutions are derived from the fuzzy transportation model and solved using standard transportation fundamental techniques.2) The best answer is found by applying the recommended ranking function to convert the fuzzy transportation model into a crisp value. The strategies that are recommended yield an effective outcome and are based on the estimating procedure. The model is validated using illustrative cases and contrasted with a few other methods that are currently in use. In practical situations, the suggested approaches are simpler and mathematically more successful.

Dynamic Analysis of Turbocharger Rotor-Bearing System Under Different Operating Conditions

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The paper delves into dynamic simulations conducted on a high-speed turbocharger (TC) system supported by linear bearings. The three-dimensional model of the turbocharger is developed in FUSION 360 and the simulations are carried out in ANSYS. First, the modal analysis of the TC is carried out and the natural frequencies and the mode shapes of the rotor-linear bearing system are identified. Further, the harmonic analysis of the system is carried out by considering the appropriate boundary conditions. Two main parameters influencing the system's response i.e., unbalanced mass and bearing stiffness are considered. These parametric studies are carried out to analyse the system's dynamic response. The critical speeds of the rotor system are also identified.

Keywords: Turbocharger, Rotor Dynamics, Modal analysis, Harmonic analysis, Linear Bearings

Class of Paracompactness In Fuzzy Topological Spaces

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Paracompactness is a natural generalization of compactness in topological space. Paracompactness and its associated tools have played a crucial role in the development of many areas of topology and analysis. The class of topological spaces such as countable paracompact, weakly and strongly paracompac, nearly paracompac, nearly weakly and nearly strongly paracompact has been investigated by many researchers. In this paper we introduced and studied the class of countable α-paracompact, nearly α-paracompact, strongly α-paracompact, nearly weakly and nearly strongly α-paracompact in fuzzy topological spaces. Also, some of its properties like hereditary property, invariance under F - continuous, F - open surjection of classes are proved.

Keywords: α-paracompactness, countable α-paracompact, nearly α-paracompactness, nearly strongly α-paracompactness, F - continuous, F - open surjection.

Existence and Uniqueness of Solution of Fractional Order Boundary Value Problem with Mixed Boundary Condition via a New Three-Step Iteration Process

Gajanan S. Patil and Haribhau L. Tidke

The present paper discusses the existence and uniqueness of a nonlinear differential equation of fractional order involving the Caputo fractional derivative with the mixed boundary condition using a new three-step iteration process. Furthermore, the study of various properties such as dependence on boundary data, the closeness of solutions, and dependence on parameters and functions. In the last part, an example is used to demonstrate each of the results.

Existence and Extremal Solution for Fractional Order Differential Equation in Partial Ordered Normed Linear Space by using Fixed Point Theorem

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In this paper, we study the existence and extremal solutions for fractional order differential equation in Partial ordered normed linear space under mixed Lipschitz and caratheodory conditions by using hybrid fixed point theorem. The results are illustrated by a concrete example.

Damage Detection of a Simply Supported Steel Bridge Structure Using Vibration Analysis

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Damage detection in a structure is crucial for ensuring safety, structural integrity, and cost-effective maintenance. Early identification of damage, such as cracks or defects prevents catastrophic failures, reduces repair costs, extends the lifespan of the structure, and such proactive action ensures the well-being of occupants and the surrounding environment. In this paper, a simply supported steel beam is considered for damage detection. Simulation is done with finite element software. to extract the acceleration data and then the Fast Fourier Transform (FFT) is applied to get the frequency responses in the beam. An experimental analysis has been carried out to extract the frequencies and mode shapes. Based on the frequencies and mode shapes the damage has been identified and localized. After the laboratory model, in order to find the damage in the actual bridge structure the dynamic parameters need to be extracted from a bridge with ambient conditions of moving vehicles. This scenario is modelled using Ansys on a simply supported beam with a known weight having a certain speed frequency and acceleration at all elements is obtained.

Keywords: Steel Structure, Natural Frequency, Mode Shape, Damage Detection, Dynamic parameters

Conversational Recommender Systems

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Conversational Recommender Systems (CoRS) are acquiring higher contemplation in the recent years. They are characterized by the capability of constituting a multi-turn dialogues with the end user. Since those systems typically work in a cold-start situation, almost all the conversations are devoted to the preference-elicitation step. On the other-hand, in order to develop good recommendations, the end user profile must be as rich as feasible, which requires great user effort. To achieve it, we try applying the Active Learning techniques to improve the preference elicitation in a CoRS. In a Conversational Recommender Systems, the users may interact with system dynamically to communicate through natural language interactions, which provide anomalous opportunities to specifically obtain the exact preference from users and give Appropriate Recommendations.

Some Theorems on Abstract Integro-differential Equationvia S-Iteration

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In this paper, we study the existence, uniqueness and other properties of solutions of abstract integrodifferential equation with nonlocal condition. The tool employed in the analysis is based on application of S-iteration method. S-iteration method has an equally important contribution to study various properties such as dependence on initial data, closeness of solutions and dependence on parameters and functions involved therein.

Keywords: Existence ,uniqueness and continuous dependence; abstract integrodifferential equation; Normal S- iterative method; Continuous dependence; Closeness; Parameters

Uniqueness of solutions to higher order differential equations with nonhomogeneous integral boundary conditions

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The purpose of this paper is to establish the existence and uniqueness of solutions to the differential equations of order m

$$^{(m)}(t) + (t)(t, w(t)) = 0\ ,\ \ t\ \in [0,1],$$

satisfying the integral boundary conditions

$$w^{(i)}(0) = 0, \qquad i = 0,1,2,\dots,m-2, \qquad w^{(n)}(1) - \eta \int_0^1 g(\zeta) w^{(n)}(\zeta) d\zeta = \mu,$$

where n ϵ $\{1,2,\dots,m-2\}$ but fixed, m≥ 3 and η is a positive real number, $\mu \in (0, \infty)$ is a parameter and f: $[0,1] \times \mathbb{R} \to \mathbb{R}$ is a continuous function. By using finer bounds on the integral of kernel, the Banach and Rus fixed point theorems on metric spaces are utilized to prove the existence and uniqueness of solutions to the problem.

Keywords: Differential equation, three-point non-homogeneous conditions, kernel, existence results, fixed point theorem.

STABILITY ANALYSIS OF $SIR\langle^{I}_{S}$ EPIDEMIC MODEL WITH EQUAL BIRTH AND DEATH RATES

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Abstract- In this paper, $SIR\langle^{I}_{S}$ epidemic model with equal birth and death rates is considered and discussed local, global stabilities at its equilibrium points. Also analyzed the spread dynamics in the population by analytical and numerical approaches. Numerical examples are presented in support of the increase in additional transaction rate or birth/death rate, there is a significant growth in susceptible population. Also, the increase in re-infection rate and recovery rate, there is an increase in infective population and removable populations respectively. Further, when additional transaction rate is inferior to the re-infection rate, there is a significant growth in infective population compared to susceptible and removable populations and when additional transaction rate is superior to the re-infection rate, there is a significant growth in susceptible population compared to infective and removable populations.

Keywords- Re-infection rate, Additional transaction rate, Disease free equilibrium point, Endemic equilibrium point, Local stability, Global stability.

AMS Subject Classification: 92D25, 92D30, 93Dxx, 93D05

Dynamic Analysis of Generalized Katugompola Fractional Differential Problem

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In this paper, we establish certain findings regarding the existence and uniqueness of solutions for a generalized katugompola fractional differential problem. Our approach relies on utilizing the notion of measure of noncompactness and Monch's fixed point theorem. Additionally, we provide results on Ulam-Hyers stability. Furthermore, we delve into an example to elucidate our primary findings.
Keywords: Generalized fractional derivative, Monch's fixed point

Implementation of Low Power ALU in 45nm Technology

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The ALU, a crucial component of the Microprocessor, carries out various arithmetic and logic operations that require significant power. There has been a significant rise in power consumption in many digital applications. Research throughout the paper, compares the structure of various ALU's with three different approaches which include CMOS, PTL, and GDI. An effective Arithmetic Logic Unit (ALU) architecture has been designed with a full adder. Initially, a full adder and logical gates with CMOS logic are implemented and observed output is in full swing mode. As the transistor count is more, power consumption is increased. To reduce the transistor count, full adder and logical gates with pass transistor logic are implemented. But there was degradation observed in the output. To get full swing and low power GDI technique is implemented in two different ways and compared. The performance of any VLSI design is dependent on chip size, power consumption, and logic delay. ALU design in CADENCE VIRTUOSO using SPECTRE simulator is described in this paper. ALU Design uses 45nm technology.
Keywords: ALU, Adder, Power, XOR, CMOS, PTL, GDI

An Analysis of Periodic Motion Using Fractional Calculus

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Fractional calculus (F.C.) has attracted engineers with its way of generalizing the notion of derivative to non-integer order. This paper investigates the applications of FC in engineering mathematics. To be precise although significant work has been done in the area of periodic motions, the proposed models and algorithms remain in the early stages of development. The analysis of periodic motion using FC is covered in this paper.

Keywords: Fractional differential equation; Simple Harmonic Oscillator; Damping

An Innovative Polynomial-Based Key Exchange Method in Non-Commutative Groups

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The article proposes a quantum-resistant, non-abelian semigroup-based key exchange system. To do this, we combine two hard problems: the discrete logarithm problem (DLP) and the equivalent decomposition problem (EDP) in order to produce a shared secret key via semi direct product operation in groups. The suggested protocol anti-attack capabilities were verified using two methods: brute force and algebraic attacks. Users of our protocol are making use of public element in secret polynomials to improve the suggested protocol security. It proves that the suggested protocol achieves positive security by drawing solid mathematical conclusions.

Keywords: Diffie-Hellman Key Exchange, Discrete Logarithm Problem, Decomposition Problem, Public Key Cryptography, Semi direct Product etc.

Scherrer and Williamson-Hall (W-H) Analysis for Calculation of Average Crystallite Size of Nanoparticles

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In the present study, we reported the calculation of the average crystallite size of undoped and Harmethod. The synthesised NPs were characterised by X-ray diffraction analysis. X-ray diffraction analysis revealed that the ZnO and the Mn-doped ZnO thin films were crystallized in the wurtzite phase with the crystallites preferentially oriented towards the (002) direction parallel to the c-axis. The crystallite size of the prepared NPs was synthesised from Williamson-Hall (W-H) analysis by assuming a uniform deformation model (UDM), uniform stress deformation model (USDM) and uniform deformation energy density model (UDEDM). The result obtained showed that the average crystallite size of undoped and Mn-doped ZnO NPs estimated from the Scherrer and W-H analysis methods were intercorrelated.
Keywords: Mn-ZnO NPs, Scherrer formula, and Williamson-Hall (W-H) analysis.

Generalized Quasilinearization of MDE for PBVP through Coupled Lower and Upper Solutions of the IVP

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In this paper, we first develop the generalized quasilinearization technique of MDE for an IVP by using coupled lower and upper solution of type I and use it to obtain the unique solution of a PBVP. In order to develop the method of quasilinearization in this set up, we fix either the lower solution or the upper solution. Further, using the method developed for IVP for MDEs, we obtain the generalized quasilinearization technique for PBVP and prove the existence of a unique solution under certain criteria.

Keywords: Coupled lower and upper solutions, Matrix differential equation, Quasilinearization technique, Periodic boundary value problem, existence and unique solution.
AMS (MOS) subject classification: 34A12, 34A34

Numerical Solution for Singularly Perturbed Differential Difference Equations Using Exponential B-spline Method

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This paper presents an exponential B-spline method for singularly perturbed differential difference equations. Taylor's series expansion is employed on mixed shifts to transform the equation to a singularly perturbed differential equation. A three term recurrence relation is obtained by implementing exponential B-spline method. The approximate solution of the equation is obtained by using invariant embedded algorithm. The convergence analysis of the proposed method is discussed. The results are compared with the available literature and we observe better results.

Keywords: Exponential B-spline, Mixed shift, Invariant embedded algorithm, Tridiagonal system, Boundary layer.

Subject Classication : Primary 65L11 ; Secondary 65L1

Real-Time Modelling and Simulation of Engineering Systems

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Simulation tools have been instrumental in improving engineering systems since the mid-twentieth century, evolving alongside advancements in computing technology. Recently, computing power has surged, delivering better performance at lower costs. As a result, simulation tools have seen significant performance improvements while becoming more affordable. Today, even researchers and engineers outside of major corporations can access these powerful tools. This presentation will discuss the latest developments in real-time modelling and validation.

Keywords: Engineering Systems, Real-Time, Simulation tools

Stability and Bifurcations in Fractional Order Generalized Logistic Map

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Difference equations are the dynamical systems involving discrete time variable. In this work, we consider the fractional order generalized logistic map(GLM) x(t) = x(0) + 1 Γ(α) Xt j=1 Γ(t − j + α) Γ(t − j + 1) (f(x(j − 1)) − x(j − 1)). where f(x) = 4μx(1−x) 1+4(μ2−1)x(1−x) , 0 < α < 1 and μ ∈ R. We provide the stability conditions for various values of fractional order α. The bifurcation analysis will be provided with the parameter μ. We also search for the chaotic behavior.

Keywords: Fractional Order Difference Operators; Logistic Map; Stability; Bifurcations; Chaos

2020 **AMS Subject Classification**: 26A33; 39A28; 39A30; 39A33.

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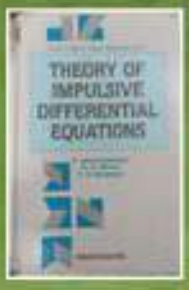

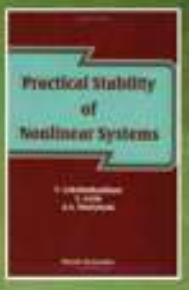





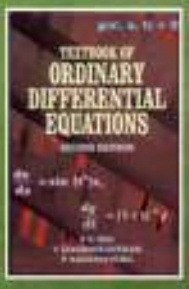







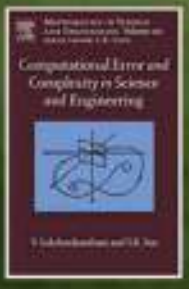



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MORPHOLOGICAL STUDY OF MAMESTRA BRASSICAE(CABBAGE MOTH) A SERIOUS PEST ON BRASSICAE ALERACAE

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ABSTRACT

This research covers the polyphagous pests known as the cabbage moth (Mamestra brassicae) and the bright-line brown-eyes moth (Mamestra oleracea), which have not been thoroughly examined in Slovenia up until now. The more widespread cabbage moth predominately feeds on Brassica plants, especially cabbage, where its caterpillars can cause significant damage. The morphology, distribution, and monitoring techniques for pest populations, as well as the management of these populations, are all topics that are covered in this study. The use of chemical insecticides is a significant component of the strategy for preventing these two pests from damaging vegetable crops. When it comes to controlling pest populations, natural predators and parasitoids, as well as other agrotechnical measures, can play a substantial influence in population reduction. Even during times of peak pest activity, farmers may still be able to harvest food that is nutritious and of good quality if they combine several tactics.

Keywords: cabbage moth, Mamestra brassicae, bright-line brown-eyes moth,

INTRODUCTION

The cabbage moth (Mamestra brassicae [L.]) and the bright-line brown-eyes moth (Mamestra/Lacanobia oleracea [L.]) are both classified as members of the Noctuidae family, which includes owlet moths and underwings, as well as the Lepidoptera order, which includes butterflies, moths, and skippers. The aboveground parts of plants are consumed by the larvae of both pests during the night and the early morning hours. Caterpillars spend their days tucked away in the shade of leaves and other above-ground plant components that are located close to the surface of the soil. On horticultural plants, the damage to the leaves and flowers is the most noticeable, but there may also be damage to the fruits. Although the bright-line brown-eyes moth favors feeding on tomato and lettuce, the cabbage moth is commonly regarded as one of the most severe pests that can affect Brassica plants. Caterpillars of both sorts can occasionally cause extensive harm to tobacco plants. Caterpillars feed on the leaves of tobacco plants. According to Sannino (2005), infestations are more prevalent in regions that do not make use of herbicides or that deliberately stimulate the growth of weeds. In recent years, Slovenia has seen a period of rainy and mild summers, which has coincided with an increase in the number of caterpillars belonging to the genus Mamestra. Between the years 2008 and 2009, pheromone traps were installed in two distinct locations with the purpose of gaining additional knowledge regarding the bioeconomics and representative ratio of the two species. The results of male captures will be used in the preparation of their control plan. The current research presents both pest species and procedures for their monitoring and management if a potential outbreak in the near future occurs, and the results of male captures will be used in this preparation.

THE CABBAGEWORM

Morphology

The forewings are brown with white dots and streaks, and the stigma is white with a broken subterminal line. Additionally, the subterminal line of the stigma is broken. The back wings have a dull gray color, and they get darker as they move closer to the tips. This particular species' wing span can range anywhere from 34 mm to 50 mm in length. To be more specific, a diagnostic spur that is located on the tibia of the foreleg (Pollini, 2006).

Figure 2: The several stages of the cabbage moth's caterpillar (Mamestra brassicae [L.])

Eggs have a form that is slightly oblong and are ridged all the way along their length. The center of the yellow of the egg has a patch that is a rusty brown color. Eggs typically have a diameter of 1.2 millimeters on average. A caterpillar in its first instar will have the appearance of a yellow-green body with three sets of legs on the thorax, a pair of appendages (anal prolegs) at the posterior end, and one to four sets of abdominal prolegs in between. The heads of the first five instar caterpillars are coppery, and their abdomens are pale green with a white stripe that continues above the stigmata. These caterpillars are in the first five instars. The dorsal side of the sixth-instar caterpillar, which is 40 millimeters in length, is colored brown, and the ventral side is colored yellow. The color of the skull, which was coppery before, has not changed (Figure 2). According to Pollini (2006), the pupae are 20 millimeters in length and have a rusty brown appearance.

Dispersion and harm

According to Pollini (2006), the cabbage moth can be found over much of Europe as well as Asia. It thrives best on the leaves of sugar beets, tobacco plants, sunflowers, and cereals, among other plants and edibles. Other vegetables and fruits, such as spinach, tomatoes, potatoes, mangolds, lettuce, and peppers, are harmed as well. According to studies conducted by Metspalu et al. (2004), the leaves of white cabbage (Brassica oleracea convar. capitata var. alba) and red cabbage (Brassica oleracea var. capitata var. rubra) are the most likely food source for the larvae of the aforementioned pest. Borecole, also known as Brassica oleracea convar. acephala var. sabellica, is only second to cabbage in terms of its susceptibility to damage caused by caterpillars. On the other hand, oilseed rape, also known as Brassica napus L. subsp. napus, is the Brassica plant that caterpillars are less interested in.

According to Shimizu and Yagi (1983), insects modify the amount of time that passes between meals as well as

the quantity of food that they consume dependent on these criteria. According to Ulland (2007), plants emit more than a thousand distinct substances into the surrounding environment in an effort to entice other forms of life. The presence of volatile components can have both direct and indirect impacts on organisms, with the latter having an important part to play in the process of drawing natural predators of pests.

The effects of the cabbage moth's toxicity on peach fruits are examined by Sannino and Espinoza (1998) as well as by Pollini (2006). According to Corvi and Nardi (1998), caterpillars can induce round bores in fruit once they have reached the lower branches of the tree. Laboratory research carried out by Sannino and Espinoza (1998) revealed that moths also fed on meadow plants like ribwort plantain (Plantago lanceolata L.) and common sowthistle (Sonchus oleraceus L.). Both of these species are classified as ribwort plantains. Caterpillars are nocturnal eaters that inflict the most harm in the fall due to the fact that their primary diet consists of the leaves of vegetables.

According to Pelosini (1999), caterpillars not only inflict material damage to crops but also lower crop quality by excreting on blooms and leaves of plants that they feed on. According to research published in 1998 by Corvi and Nardi, pathogenic fungus and bacteria can move from sick plants to other plants.

Figure 1: Left: Mamestra caterpillar damage to outer leaves of cabbage plant; right: caterpillar damage to cabbage head

The Brown-Eyed Blinker Moth (Mamestra/Lacanobia oleracea [L.])

Morphology

The forewings are brown and spotted, and they have a white stigma that is edged with white and a white subterminal line that is broken. Between 30 and 50 millimeters is the length of the forewings when they are fully stretched. On each wing there is a yellow speck in the middle of a brown area. Wings that have a grayish hue to them. The hue of the thorax and the abdomen is similar to that of a light brown. According to INRA (2008), there is no hook at the end of the tibia where it meets the fibula.

Eggs laid by the brilliant-line brown-eyes moth have a brilliant green hue, hemispherical in shape, and laid in a

manner that is flatter than normal. They measure exactly 0.7 millimeters in length. Caterpillars are a dark green color with a brown head and lines that are bright yellowish white and run across their body. As the larvae get closer to becoming pupae, the stripes on their bodies become less obvious. They only reach a length of 35–40 mm once they have reached their full maturity (INRA, 2008). After five stages of development, the pupa stage takes place. The caterpillar larvae typically gather close to the egg mass in order to consume their food. The older caterpillars migrate from plant to plant, which contributes to the species's distribution. Caterpillars feed intensively for a period ranging from 10 to 18 days before tunneling underground to pupate. They have 16 real legs and two sets of artificial ones in total. The pupa begins its life as a yellowish green tint, eventually transforms into a dark brown color, and grows to be between 16 and 19 mm in length. Pupation takes place in a silken cocoon that is buried two to six centimeters below the surface of the soil. The entirety of the developmental cycle takes place over the period of a month.

Distribution and damage

The Bright-line brown-eyes moth can be found across the continents of Europe, Asia, and North Africa in its natural habitat. This polyphagous beetle may feed on vegetables such as tomato, lettuce, cabbage, root and petiole celery, and mangold. Other probable food sources include celery. In addition to eating trees like the willow and the elm, it also consumes crops such as soybeans, tobacco, sugar beets, and a number of other types of food. According to Pollini (2006), apple and peach trees are the most common types of trees that are attacked by pests.

When caterpillars are young, they only do minor harm to the underside of leaves; nevertheless, by the time they have reached their full size, they are able to consume the entire leaf. In large orchards, particularly those that use fewer insecticides, caterpillars can be a problem for other fruit trees as well, including apples and peaches (Pollini, 2006). Caterpillars can cause harm to other fruit trees.

Bionomics

The second half of April is when butterflies first emerge, and they will continue to fly throughout May and June. Butterflies are most active at night. In the same manner as cabbage moth females, bright-line brown-eyes moth females deposit their eggs on the undersides of leaves in clusters ranging from 200 to 800 in number. The development of an embryo is finished between 5 and 10 days after it was first fertilized. Caterpillar larvae emerge from their nests in groups at first, but they eventually become more independent. Once their development is complete, caterpillars go into a stage called the pupation stage, which takes place 10 cm underground. The second-generation adults take to the skies beginning at the end of July and continuing until the beginning of August. They continued to fly frequently throughout the entire month of September and into the early part of October. According to Vacchi and Cioni (2006), the second generation of caterpillars reaches maturity around the second part of October and then enters a condition of hibernation in order to survive the winter.

GENUS MOTH WATCHING Mamestra

Controlling moths (family Noctuidae) typically involves the use of chemical insecticides. When plants are treated early, while caterpillars are still young and feeding just on the outer leaves, and at least 10–15 percent of the leaf area has been injured, the treatment is more acceptable and effective. When treating plants that have been injured, it is easiest to do it in the evenings and mornings, when caterpillars are most active.

For insecticides to be effective against cabbage moth larvae, their length must be less than 12 millimeters at the

time of application. Caterpillars that have matured and grown in size have improved camouflage capabilities, allowing them to avoid being killed by insecticides. The rosette-like form of iceberg salad is an excellent illustration of this point because it offers protection from the bright-line brown-eyes moth.

Because the growth of cabbage moth and bright-line brown-eyes moth larvae is mostly dependent on the temperature of their surrounding environment, it is difficult to correctly forecast the time of treatment that will be required for a particular location. For this reason, it is absolutely necessary to keep a close eye on the cyclical changes that occur within butterfly populations. There is a wide range of options available for monitoring the activities of adults. Pheromone traps are a tried-and-true method of detection that has proven to be successful. We are able to lure males with this method while simultaneously discouraging them from mating. With the assistance of the trap, one is able to determine when the optimal moment is to spray insecticides. According to Pop et al. (1999), the addition of ethers to pheromone traps, which are utilized to control and monitor butterfly populations, causes the traps to become more efficient while simultaneously lowering their associated costs. Pheromone traps are helpful for following the population trend of a pest, but evaluating the degree of the damage caused by it requires knowledge of oviposition and relevant egg development (Corvi and Nardi, 1998). Pheromone traps are a valuable tool for tracking the population trend of a pest.

Insect light traps that contain mercury lamps with a wavelength of up to 400 nm can be used to monitor moths and their movements. Similar traps, on the other hand, are used in studies of environmental abundance for a wide variety of potentially harmful, useful, and neutral species (Dodok, 2003). This is due to the fact that these traps do not exhibit selectivity. Johansen (1996) developed a mathematical model to anticipate the prevalence of the cabbage moth in Norway by factoring in the average daily temperature in that country. The data for the model came from an experiment that took place over the course of three years and involved the use of pheromone traps to count butterflies.

The amount of cabbage and bright-line brown-eyes moths that are consumed by butterflies is probably minimal when weighed against the potential damage that can be caused by caterpillars. According to Campagna (2005), this could be due to the fact that the bugs in question are omnivores.

CONTROL

Chemical control

There is still a significant amount of use for organic phosphorus esters in the prevention of leaf moths. According to Pelosini (1999), some examples of active compounds that belong into this group are acephate, chlorine pirifos-methil, and phenitrotion. Pyrethroids (cypermethrin, deltamethrin, lambda-cyhalothrin, beta- cyfluthrin, and tefluthrin) are another method that can be used to reach the desired level of effectiveness in this scenario. In order to battle cabbage moth, Slovenia has authorized the use of products from the pyrethroid family, a product based on pyrethrin, a substance that is chemically similar to oxadiazine, and a product from the insect development inhibitors (IRI) family. All of these products can be found in Slovenia. Fastac 10% SC (alfa-cypermethrin) and Karate Zeon 5 CS (lambda-cyhalothrin) are the pyrethroids that are approved for use in Slovenia. No other insecticides now available on the market are effective enough to remove the bright-line brown-eyes moth.

Pyrethrin, which is sold under the brand name Spruzit powder, and indoxacarb, which is sold under the brand

name Steward, are two other medications that are utilized for the control of cabbage moths. The active component known as indoxacarb can be found in the advanced oxadiazines. Insecticides that belong to the class of oxadiazines are able to block the sodium channels that are found in nerve fibers. Insects are rendered incapable of eating, continue to remain paralyzed, and ultimately perish. Product Steward is compatible with lean production and works well with it.

According to Corvi and Nardi (1998), chitinase inhibitors are safe for human consumption because it is highly improbable that they will cause any harm to people. According to Pelosini (1999), active chemicals that inhibit the growth of insects fall under the category of growth inhibitors. These compounds include teflubenzuron, esaflumuron, and lufenuron. This final one is a legitimate part of a Match 050 EC that was manufactured in Slovenia, and it displays the registration number on its surface.

If caterpillars are found on the ground at any point of their life cycle, Corvi and Nardi (1998) recommend treating the area with pyretroids or carbamates in order to eradicate the pests. Both categories of pesticides are neurotoxins, which means they kill insects either by direct contact or by entering their digestive systems. The authors advocate the use of organic phosphorus esters, which function through the respiratory system, for the management of additional plant pest species. These esters may be found at most health food stores.

When it comes to controlling cabbage moths on cauliflower (Brassica oleracea var. botrytis), Corvi and Nardi (1998) recommend using a combination of synthetic insecticides (pyretroids, carbamates, organic phosphorus esters, and growth regulators) and at least spraying with microbiological products based on Bacillus thuringiensis var. kurstaki in the fall.

Crop protection with natural products

Alongside the use of chemical insecticides, more and more integrated and biological farming practices are turning to the use of insecticides that come from natural sources (Gengotti in Censi, 2004). It has been found that the bacteria Baccilus thuringiensis var. kurstaki, which produces naturally occurring molecules that are very similar to those found in chemical pesticides, can successfully take their place. In addition, the results of several tests demonstrated that azadirachtin, rotenone, and natural pyrethrin were successful in warding off cabbage moths and bright-line brown-eyes moths.

The seeds of the tropical plant Azadirachta indica A. Juss. contain a natural insecticide that is effective against a wide variety of pests. One of its defining characteristics is that it has a low risk of poisoning to animals. Its systemic effects are brought about due to the fact that it is taken up by the plant's roots and leaves. After that, it is transported to various locations throughout the facility. Although it has a wide range of efficacy, azadirachtin does not kill insects immediately; rather, it interrupts the normal life-cycle activities of insects to the point that they are unable to absorb food, reproduce, or transition into a new stage of life. This results in their death. According to research published by Gengotti and Censi (2004), the azadirachtin medicines are intended for preventative therapies and have a short withholding time.

Bacillus thuringiensis is an example of an aerobic bacteria that produces a toxin. This toxin does not begin to exercise its toxic effects until it has been consumed by the creature that is its target. Caterpillars that have been fed on parts of treated plants may cease eating and die of starvation in just a few short days if they have been exposed to the treatment. There are four subspecies of the bacterium: kurstaki, aizawai, tenebrionis, and

israelensis. The kurstaki and aizawai subspecies are useful for controlling Lepidoptera larvae, and the tenebrionis and israelensis subspecies are excellent insecticides against pests in the Coleoptera and Diptera orders, respectively. Products containing the active component Bacillus thuringiensis var. kurstaki have the benefit over other products used against cabbage moth and bright-line brown-eyes moth in that they are not harmful to vertebrates and do not kill beneficial insects. Because of leaching and photolability, it is necessary to apply the insecticide in question on a consistent basis through spraying.

Pyrethrins are produced by the maceration of the flowers of the plant Chrysanthemum cinerariaefolium Vis., and these pyrethrins are safe for mammalian consumption. Because they are not selective and have a low persistence on plants, even though their control spectrum is broad, pests are able to quickly reappear after being eliminated (Gengotti in Censi, 2004). To make products last longer on the shelf, man-made and naturally occurring compounds like piperonil butoxide (PBO), for example, are frequently used.

The tropical legume known as Derris elliptica (Wallich) Benth is the source of the chemical known as rotenone. When employed as insecticides, the chemical that was just mentioned is exceedingly harmful to mammals as well as insects that feed on other insects. According to one study (Gengotti in Censi, 2004), it has a withholding period that is longer than that of the majority of pesticides (up to 10 days), and it is effective against harmful organisms in a short amount of time.

CONCLUSIONS

There are two common instances of owlet moths (Noctuidae) that can cause severe damage to cole crops and vegetable gardens. These insects are called the cabbage moth and the bright-line brown-eyes moth, respectively. Natural products that are less detrimental to the environment are utilized in addition to chemical insecticides in order to reduce the amount of damage caused by these pests. When it comes to cultivating vegetables, soil culture is a vital component to think about in addition to the research and development of new insecticides. Examples of the latter include deep fall cultivation with the intention of killing overwintering pupae, as well as the use of interseeding, intercropping, and cover crops. Alongside the aforementioned strategies, an increased emphasis is placed on natural enemies of the species that are considered pests. They are dangerous and will annihilate moth eggs and larvae in their entirety. Because of the high expectations placed on their efficacy, their usage in hydroponics agriculture, particularly in greenhouses, is strongly encouraged. Parasitoid moths such as Trichogramma evanescens have the potential to significantly improve future plant protection efforts while also lowering the negative influence that humans have on the environment. It is necessary for us to commit a greater amount of resources to hunting for species belonging to the genus Trichogramma on the territory of Slovenia because we do not currently know anything about the prevalence of species belonging to this genus there. Once their domestic status has been determined, they might be able to be incorporated into food production systems.

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Study of ovarian maturation of freshwater female prawn, *Macrobrachium rosenbergii* with Reference to histological and visual changes

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ABSTRACT

According to the general appearance and macroscopic observations of ovary, oocyte diameter ad histology of ovarian tissues four different stages of ovarian development were found viz., Immature, Maturing, Mature and Spent. The distinction of different stages of the oocyte depends upon their cytoplasmic content, changes in the nucleus and size of the oocytes which can be classified as, Oogonia which are small spherical cell with round nuclei which lack stainable yolk material. The average cell diameter was (24.02 µ), nuclear diameter (17.4 µ) and cell volume (7416.955 µ). Pre-vitellogenic oocytes **-** These oocytes increase in volume and acquire a large amount of basophilic cytoplasm with devoid of yolk material. Oocytes measures (38.16 µ), (24.48) and (29080.61 µ) in cell diameter, nuclear diameter and cell volume respectively. Vitellogenic oocytes **-** The oocytes enter a synthetic phase resulting in the formation of yolk. The appearance of follicle cells is noticed in these oocytes. The nucleus, nucleolus, ooplasm and follicular cells undergo marked changes in their cytology *viz.,* Vitellogenic-I oocytes which measured (60.24 µ), (11.28 µ) and (114401.9 µ) in cell diameter, nuclear diameter and cell volume respectively. Vitellogenic-II oocytes measures about (94.51 µ), (34.32 µ), (216482.13 µ) in cell diameter, nuclear diameter and cell volume respectively. Vitellogenic-III oocytes measures about (156.96 µ), (27.84 µ), (2023696.3 µ) in cell diameter, nuclear diameter and cell volume respectively. Whereas, degenerating oocytes are almost of the same size as tertiary vitellogenic oocytes and can be located by disintegration of the nucleus and appearance of vacuoles.

Key words: *Ovarian maturation, Histology, Ovarian colour, Macrobrachium rosenbergii.*

Introduction

In marine and freshwater invertebrates, the annual reproductive cycle may be assessed by various methods like observations of spawning, percentage of ovigerous female against time and presence of ripe gametes in gonad, occurrence of larvae in the plankton etc. Three standard methods for determination of the reproductive cycle in crustacean decapods were used; gonadosomatic index (GSI), oocyte diameter and proportion of ovigerous females. Analysis of the histological sections of each ovary determined the morphological characteristics, size and frequency of different oocyte types and the observation of visual features coupled with histological characteristic was found to represent a reliable procedure to evaluate the ovarian maturation (Peixoto *et al*., 2003; Lin Wang *et al*., 2020). The morphological aspects of the gonads and germ cells used by most workers to determine the stage of sexual maturity, especially in the more economically important crustacean species. Visual observation of

females, like shape and color of their ovaries, has been routinely used to assess the phase of maturation of penaeids. In captivity, exact identification of ovarian development is essential in order to avoid excessive handling stress and waste of fertile spawns into the tanks (Browdy, 1992). Histological analysis has been widely used to describe ovarian maturation stages of penaeids but there is lack of information showing its relationship with visual changes during ovarian development (Tan Fermin and Pudadera, 1989; Quinitio *et al*., 1993). The classification of gonadal stages vary from author to author. In penaied shrimp, Tan Fermin and Pudadera (1989) have recognized three to eight stages. First and the last stages are generally termed "immature and spent" (out spawn). The intermediate phases are variously named development, inactive, prematuration, near mature, maturing, active and mature. Peixoto *et al*., (2003) reported the description of the ovarian development of *F. paulensis* connecting histological sections and photographic features using a chromatic scale. The knowledge of reproductive biology, reproductive cycle, ovarian maturity stages and the timing of breeding, are required for both marine and freshwater commercially important crustaceans is used in the stock assessment, developing, and evaluating strategies for fisheries management. The present study describes the ovarian development stages of freshwater female prawn, *M. rosenbergii* through the combined observations of histological and visual characteristics.

Materials and Methods

Freshwater prawns, *M. rosenbergii* were collected monthly from the "Girna Dam", Tq. Malegaon Dist. Nasik, Maharashtra State, for period of two consecutive years. Collected animals were brought in the laboratory in the first week of every month on fixed date and time to avoid fluctuations if any. Other parameters like temperature, pH, salinity, and photoperiod etc. were not considered. From the collection, only healthy female prawns were selected and immediately sacrificed to record the histomorphological observations of ovary. For histological studies of ovaries were dissected out and fixed in bouin's fluid. After 24hrs fixation, the tissues were kept under running tap water with the help of muslin cloth for removal of bouin's fluid. Then tissues were passed through different alcoholic grades for dehydration, followed by cold impregnation, hot impregnation and embedded in the paraffin wax (m.p. 58-60 °C). The tissues embedded in the paraffin wax were trimmed and sectioned at 8µ and 6µ for gonads. Sections of the ovaries were stained with Delafield's haematoxylin-eosin stain. Aspects such as gonad colouration and stages of maturity were registered by macroscopic observation of the ovary. The stained sections of ovary were observed under microscope at different magnifications for histological studies. Measurements of oocytes were recorded with stage occularmicrometer.

Results and Discussion

In crustaceans, the ovarian maturation assessed by various methods like observations of spawning, the percentage of ovigerous female against time and presence of ripe gametes in gonad, occurrence of larvae in the plankton etc. Three standard methods for determination of the reproductive cycle in crustacean decapods were used; (1) gonadosomatic index (GSI), (2) oocyte diameter and (3) proportion of ovigerous females. Based on the visual changes in colour, position, and microscopical examination of ovary four maturity stages were recognized, immature, maturing, mature and spent. Colour change in the ovary during maturation is well known for crustaceans; mainly for shrimps (Dall *et al*., 1990). Sethuramalingum *et al*., (1982) identified on the basis of colour of ovary and suggested three stages of ovarian development (immature, mature and spent) in *Portunus sinipes* and in *Thalamitachaptali*. In present study the ovarian development were also grouped in four stages viz., Immature – in this slight development of the ovaries with slender anterior and posterior lobes were restricted to the body cavity. Ovaries were white, translucent, and difficult to distinguish from surrounding muscles, maturing – in this stage ovaries were grown in volume, showing light yellow in colour and the organ appears distended, firm to touch, indicating increase of germ cells suggesting early stage of vitellogenesis. Mature – in this stage gonad was fully developed occupying all available space in the body cavity. It became more sinuos and extended up to the second abdominal segment. The colour observed was orange or reddish. Spent - after ovulation oocytes and other cells resorbed by the ovaries, the gonads become flaccide with pigmented areas and empty spaces internally. At this stage of ovary, colour and size was more similar like in the immature stage, and the

gonad of spwaned prawn was newer entirely restored to the condition of original maturity. In the present study histological studies showed that the ovarian wall in *M. rosenbergii* is covered with two membranes, an outer most epithelial layer and inner layer of germinative epithelium (Fig. 2). The ovarian wall is continuous with ovarian stroma and is thicker during post spawning period but becomes thin at maturing and mature stages of the ovary. A germinal zone is restricted only to medioventral portions of the ovarian lobes. This portion is distinguished by the presence of compact mass of oogonia and small oocytes. During primary stages of maturation, the germinal zone consists of oogonia and pre-vitellogenic oocytes whereas; the developing oocytes are displaced towards the marginal region of the ovary (Fig. 3). A few primary or residual oogonia, which occur throughout the year in the germinal zone, divide mitotically shortly after ovulation and give rise to additional oogonia for further growth of ovary. Oogonia are a small spherical cell with round nuclei surrounded by a thin rim of poorly basophilic oocortex, which lacked stainable yolk material (Fig. 2). Oogonia develop into previtellogenic oocytes but a few remain undifferentiated (residual oogonia) until the ovulation. The average cell diameter was (24.02) and nuclear diameter (17.4) with (7416.955) cell volume (Table 1, Fig. 2). In pre-vitellogenic oocytes the oocytes increase in volume and acquire a large amount of basophilic cytoplasm with devoid of yolk material. The nucleus appears vesicular containing peripherically arranged chromatin clumps and 2-3 nucleoli, which appear solid and stained black with heamatoxylin. There is no yolk formation and oocytes measures (38.16), (24.48) and (29080.61) in cell diameter, nuclear diameter and cell volume respectively. Cytoplasmic volume (21403.23) increased compared with oogonia (4660.0026) (Table 1, Fig. 3). In

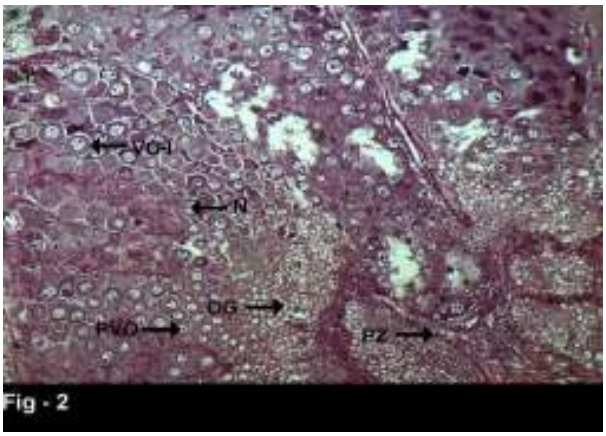

Fig. 2. Photomicrograph of the ovary showing immature stage of *M. rosenbergii*. Haematoxylin- eosin X 100. VO-I : Vitellogenic oocyte-I PVO: Previtellogenic oocyte N : Nucleus OG : Oogonia PZ : Proliferating Zone

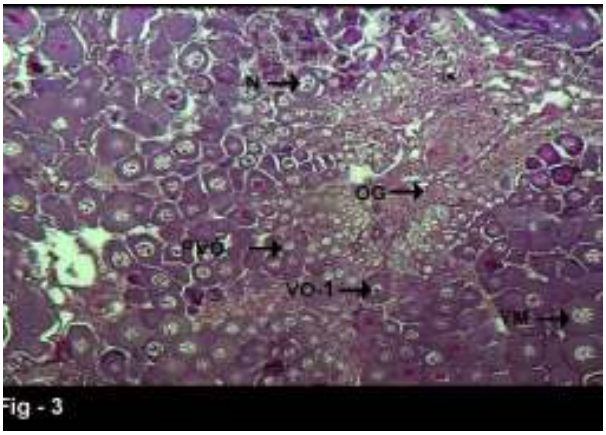

Fig. 3. Photomicrograph of the ovary showing maturing stage of *M. rosenbergii.* Haematoxylin-eosin X 100. N: Nucleus, OG: Oogonia, PVO: Previtellogenic oocyte VO-I: Vitellogenic oocyte-I YM: Yolk material

Table 1. Changes in the size of oocytes during oogenesis in *M. rosenbergii*

Oocyte stage	Cell diameter (μ)	Nuclear diameter (μ)	Cell volume $(\mu)^3$	Nuclear volume $(\mu)^3$	Cytoplasmic volume $(\mu)^3$	Nucleo-cytoplasmic ratio N/C
Oogonia	24.02	17.4	7416.955	2756.93	4660.0026	0.591616
Previtellogenic	38.16	24.48	29080.61	7677.37	21403.23	0.3587014
Vitellogenic-I	60.24	11.28	114401.9	751.11	113650.79	0.0066
Vitellogenic-II	94.51	34.32	216482.13	21155.34	195326.19	0.1083
Vitellogenic- III	156.96	27.84	2023696.3	11292.39	2012404.01	0.00559

Cell Volume = $4/3\pi r^3$, Nuclear Volume = $4/3\pi r^3$, Cytoplasmic Volume = Cell Volume – Nuclear Volume

vitellogenic oocytes the oocytes enter a synthetic phase resulting in the formation of yolk. The appearance of follicle cells was noticed in these oocytes. The nucleus, nucleolus, ooplasm and follicular cells undergo marked changes in their cytology as described as; Vitellogenic-I oocytes - Increase in amount of ooplasm and the appearance of small yolk droplets in peripheral ooplasm takes place. Yolk droplets stain purple to black with haematoxylin. Nucleus is solid central in position. Thin layer follicular cells, which are small, found around the oocytes. Increase in oocyte diameter is accompanied by increase in amount of yolk droplets, which progressively extends towards the perinuclear region (Table 1, Fig. 3). These oocytes measured (60.24), (11.28), (114401.9), in cell diameter, nuclear diameter and cell volume respectively. Nuclear volume and cytoplasmic volume increased compared with oogonia and pre-vitellogenic oocytes. Vitellogenic-II oocytes - These oocytes are characterized by the synchronous growth to large size and the unstainable vacuoles increase in number. Vacuoles merged with each other and finally form large unstainable yolk vesicles, initially in marginal ooplasm. This is followed by the arrival of small eosinophilic yolk granules in the extra vesicular ooplasm. The follicular cells are same as in the primary vitellogenic oocytes. These oocytes measure about (94.51), (34.32), (216482.13) in cell diameter, nuclear diameter and cell volume respectively (Table 1, Fig. 3). Vitellogenic-III oocytes - With further growth of oocytes, the amount of yolk globules increases. Yolk droplets are absent because of their alteration into yolk vesicles. Ooplasm thus becomes entirely acidophilic. Yolk globules occupy most of ooplasm including the perinuclear region. Follicle cells appears in round to oval with spindle shapes nuclei. These oocytes measure about (156.96), (27.84), (2023696.3) in cell diameter, nuclear diameter and cell volume respectively. Highest nuclear volume and cytoplasmic volume observed for vitellogenic-III oocytes with rest of stages of oocytes (Table 1, Fig. 4). Degenerating oocytes - In *M. rosenbergii,* the process of degeneration (oosorption or resorbtion) may be simultaneous with oocyte growth. The gathering and competition among the oocytes rendered some of them in a degenerating stage. During favorable conditions, the mature oocytes undergo ovulation. Degenerating oocytes are almost of the same size as tertiary vitellogenic oocytes and can be located by disintegration of the nucleus and appearance of vacuoles. The degenerating ova are surrounded by nutritive phagocytes and some of them enter in to the ova (Fig. 5). Ovarian maturation of several species has been described according to the external appearance of the ovary (King, 1948; Crocos and Kerr, 1983; Pexioto *et al.*, 2003). Ovarian size and colours were related to histological changes in *Callinectes sapidus* and *Geryon quinquedens* (Sigana, 2002). Pillay and Ono (1978) grouped the developing ovaries of grapsid crabs based on colour and size of the ovaries. The results

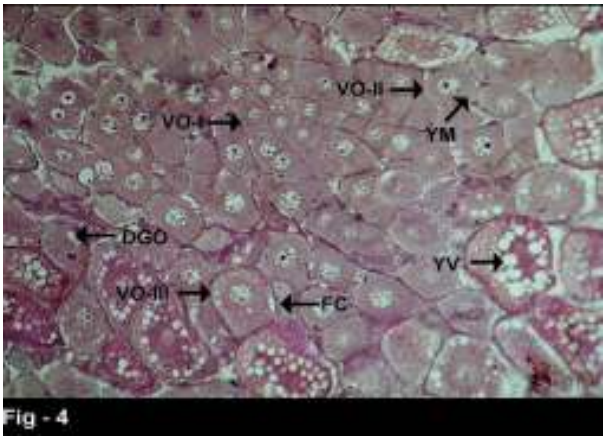

Fig. 4. Photomicrograph of the ovary showing mature stage of *M. rosenbergii*. Haematoxylin-eosin × 100.
DGO: Degenerating oocyte VO-I:Vitellogenic oocyte-I, VO-I I:Vitellogenic oocyte-II VO-III: Vitellogenic oocyte-III
FC: Follicular cell YM: Yolk material, YV: Yolk vesicle

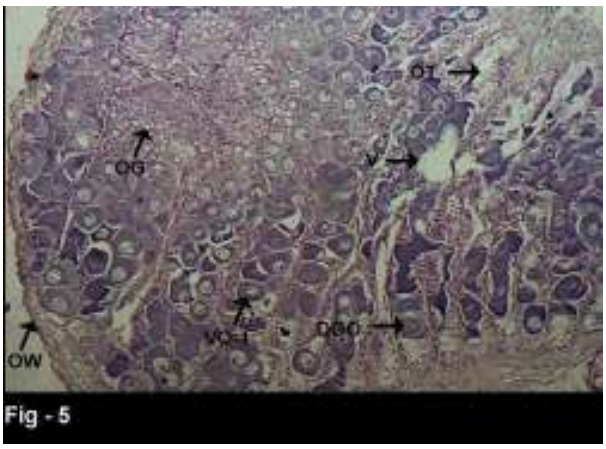

Fig. 5. Photomicrograph showing spent stage of the ovary. Haematoxylin-eosin × 100.
DGO : Degenerating oocyte VO-I : Vitellogenic oocyte-I OT : Ovarian tissue V : Vesicle OG: Oogonia ,OW : Ovarian wall

from histological study of ovarian tissue showed that changes in colour and shape of the ovaries match very well with development of oocytes. The classification of the ovarian maturation stages using the colour scale and histological analysis described here may be used practically for the management of *M. rosenbergii* female maturation in captivity.

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The impact of environmental toxins on the animal gut microbiome and their potential to contribute to disease

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ABSTRACT

Environmental toxins have the potential to disrupt the animal gut microbiome (AGM), which can lead to various gut-associated diseases such as inflammatory bowel disease (IBD) and colorectal cancer. In this review, we provide an overview of environmental toxins, their sources, and exposure routes. We also discuss the importance of AGM in maintaining human health and the effects of environmental toxins on AGM, including dysbiosis, alterations in diversity, and microbial metabolism. We present evidence linking environmental toxins exposure to gut-associated diseases and mechanisms by which environmental toxins affect AGM. We also highlight factors that influence the effects of environmental toxins on AGM, such as dose, duration, and individual susceptibility. Finally, we discuss strategies to mitigate the effects of environmental toxins on AGM, including prebiotics, probiotics, and dietary interventions, as well as regulatory aspects of environmental toxins, including safety thresholds, exposure limits, and risk assessment. We conclude by discussing future research directions and the potential for personalized approaches, targeted detoxification, and ecological restoration of AGM to prevent and treat gut-associated diseases.

Introduction

Environmental toxins are substances that are harmful to living organisms and their surrounding environment. These toxins can be found naturally in the environment, or they can be man-made chemicals that are introduced into the environment through various sources (Nalage et al., 2023; Patil et al., 2023c). Some examples of natural sources of environmental toxins include volcanic eruptions, wildfires, and certain plant and animal species that produce toxic substances. Anthropogenic sources of environmental toxins can include industrial pollution, agricultural runoff, transportation emissions, and household chemicals (Landrigan & Landrigan, 2018).

Exposure to environmental toxins (Fig. 1) can occur through various routes, including inhalation, ingestion, and skin contact. Inhalation of toxins can occur through breathing in polluted air, while ingestion can occur through contaminated food and water. Skin contact can occur through direct contact with toxic substances, such as handling chemicals without proper protective equipment. It is important to note that exposure to environmental toxins can have negative effects on human health, including the disruption of AGM. As such, it is important to be aware of potential sources of environmental toxins and take steps to minimize exposure in order to protect human health and the environment (Patil et al., 2023b; Rovira et al., 2015).

AGM and human health

AGM is an ecosystem of microorganisms, including bacteria, viruses, fungi, and other microbes, that live within the gastrointestinal tract of humans and animals (Patil et al., 2023a). This complex ecosystem plays a crucial role in maintaining human health and well-being. AGM is involved in various physiological processes, including digestion, nutrient absorption, and immune system function. It also plays role in

Abbreviations: AGM, animal gut microbiome; IBD, inflammatory bowel disease.

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the development and maturation of the immune system, helping to shape immune responses and protect against infections (Sontakke et al., 2022).

In addition, AGM is involved in the production of important metabolic compounds, including short-chain fatty acids and vitamins such as vitamin K and B vitamins (Nalage et al., 2022). These compounds have a wide range of functions in the body, including energy metabolism, hormone regulation, and DNA synthesis. The composition of AGM can vary widely between individuals, influenced by factors such as diet, age, genetics, and environmental exposures. A diverse and balanced AGM is thought to be important for maintaining optimal health, while disruptions in the microbiome, such as dysbiosis, have been linked to a range of diseases, including IBD, obesity, and metabolic disorders. In general, AGM is a sophisticated and significant ecosystem that is essential to preserving human health and wellbeing. To create methods to encourage and preserve a healthy biome, it is crucial to comprehend its makeup and functions (Rodríguez et al., 2015).

Environmental exposures

Environmental exposure to various xenobiotics such as heavy metals, pesticides, and food additives can induce gut microbiome toxicity and contribute to the development or exacerbation of human diseases. This toxicity can occur through direct or indirect impacts on the gut bacteria, resulting in altered microbial diversity and metabolism. The selection of resistant bacteria upon exposure to certain xenobiotics can lead to an unbalanced gut ecosystem. Representative xenobiotics such as antibiotics, heavy metals, pesticides, and artificial sweeteners are highlighted for their significant functional alterations on the gut microbiome. However, the mechanistic basis underlying these effects remains unclear. Here, we reviewed effects of environmental chemical exposure on the gut microbiome, specifically focusing on the influence of bisphenols, phthalates, heavy metals, and pesticides (Fig. 2).

Bisphenols

Bisphenols, including Bisphenol A (BPA), have been thoroughly examined for their impact on the gut microbiome. Exposure to bisphenols can result in changes in microbial diversity, shifts in bacterial abundance, and dysbiosis. Moreover, bisphenols have the potential to disrupt essential microbial metabolic processes, potentially affecting nutrient absorption, immune function, and gut barrier integrity (Table 1) (Chen et al., 2018a; DeLuca et al., 2018; Diamante et al., 2021; Feng et al., 2020; Javurek et al., 2016; Kaur et al., 2020; Malaisé et al., 2017; Reddivari et al., 2017).

Phthalates

Phthalates, commonly found in plastics and consumer products, are associated with disturbances in the gut microbiome. Studies suggest that exposure to phthalates can lead to shifts in microbial composition and diversity, alongside alterations in microbial gene expression. These changes may contribute to adverse health outcomes, including metabolic disorders and immune dysregulation (Table 2) (Buerger et al., 2020; Fu et al., 2021; Hu et al., 2016; Kolb et al., 2019; Lei et al., 2019; Wang et al., 2019; Xiong et al., 2020; Yang et al., 2019).

Heavy metals

Environmental contaminants like lead, mercury, and arsenic, known as heavy metals, have detrimental effects on human health. Recent evidence suggests that heavy metal exposure can impact the gut microbiome. Heavy metals can alter microbial diversity, potentially leading to dysbiosis. These changes may contribute to the development of gastrointestinal disorders and systemic health issues. (Table 3)(Chen et al., 2018b; Dechartres et al., 2019; Fang et al., 2018; Gao et al., 2017, 2019; Jin et al., 2017, 2018; Rouzé et al., 2019).

Fig. 1. Factors which impact on AGM.

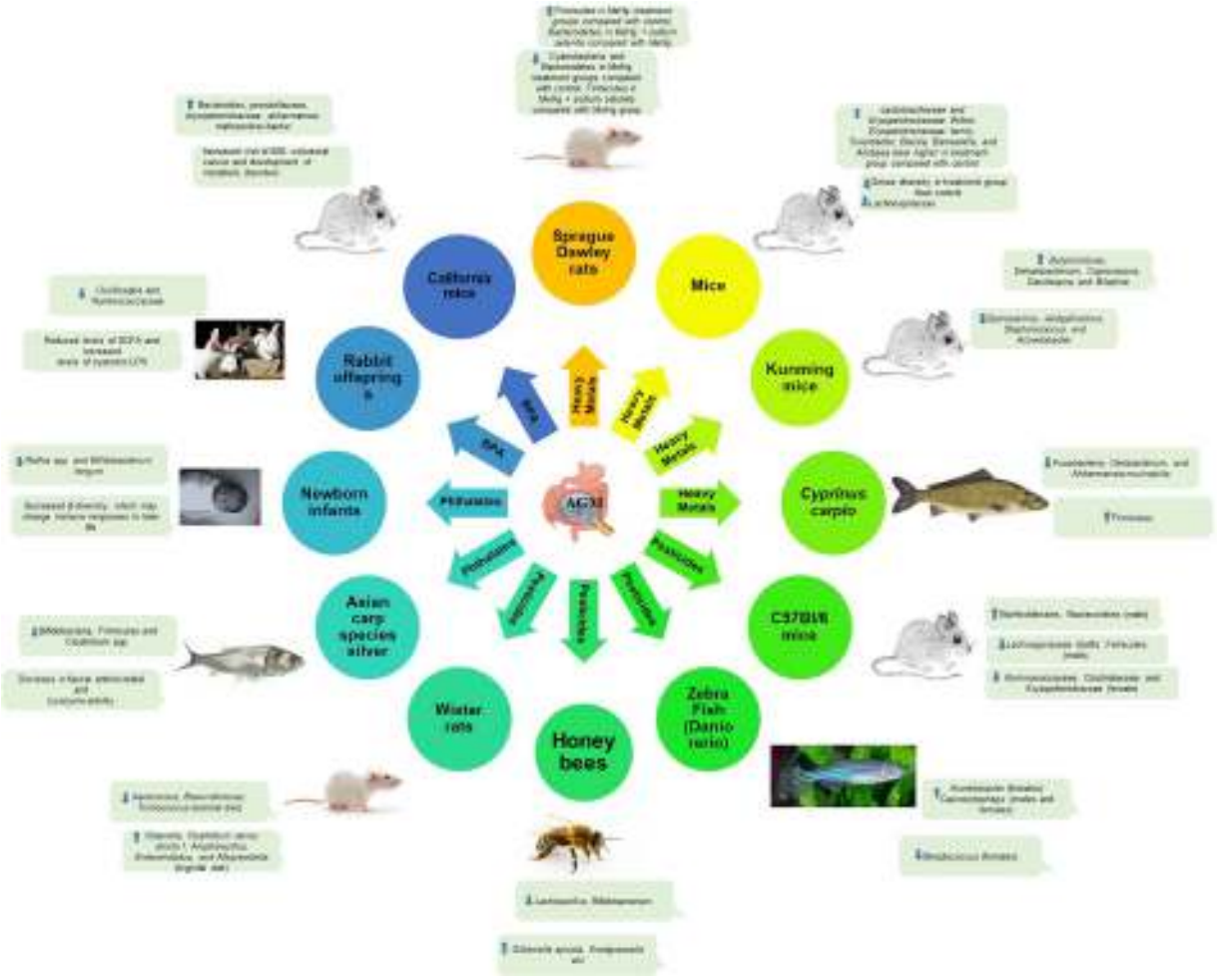

Fig. 2. Impact of environmental chemicals on AGM.

Pesticides

Pesticides, commonly utilized in agriculture to manage pests and enhance crop yield, have been associated with disruptions in the gut microbiome. Exposure to pesticides can result in alterations in microbial composition, changes in microbial gene expression, and disturbances in microbial metabolic processes. These disturbances may lead to adverse health effects, including gastrointestinal disorders and immune system dysregulation. (Table 4) (Breton et al., 2013; Chang et al., 2019; Dheer et al., 2015; Gaulke et al., 2018; Liu et al., 2019; Ruan et al., 2019; Wu et al., 2019; Zhang et al., 2015).

Impact of environmental toxins on AGM

Environmental toxins can have significant effects on AGM, leading to dysbiosis, alterations in microbial diversity, and changes in microbial metabolism (Chiu et al., 2020).

Dysbiosis refers to an imbalance in the composition of the gut microbiome, which can lead to changes in the microbial community's function and behavior. Exposure to environmental toxins can lead to changes in AGM by altering the microbial populations, leading to a reduction in beneficial bacteria and an increase in harmful bacteria. This shift can result in alterations in the microbial metabolism, including the production of short-chain fatty acids, amino acids, and other compounds that are important for human health (Fan et al., 2021).

In addition to changes in the microbial populations, environmental toxins can also impact the diversity of AGM. Studies have shown that exposure to certain toxins, such as heavy metals and pesticides, can reduce microbial diversity, leading to a less resilient microbial community that is less able to protect against disease and infection. Environmental contaminants can also interfere with AGM's metabolic activities, changing how key substances like SCFAs and other metabolites that are crucial for sustaining gut health are produced. AGM can be significantly impacted by contact with environmental contaminants, which can result in dysbiosis, changes to the microbial community, and adjustments to the microbial metabolism. These modifications may have negative effects on human health, raising the risk of infection and illness. To create plans to safeguard and maintain a healthy microbiome, it is essential to comprehend the mechanisms through which environmental contaminants affect the gut microbiota (Chiu et al., 2020).

Evidence linking environmental toxins exposure to gut-associated diseases

Exposure to environmental toxins has been linked to the development of several gut-associated diseases, including IBD, colorectal cancer, and other gastrointestinal disorders. There is a growing body of evidence that suggests that exposure to environmental toxins can increase the risk of these diseases and contribute to their development. Crohn's disease and ulcerative colitis are two examples of the chronic inflammatory gastrointestinal disorders known IBD (Vasefi et al., 2020). Studies have shown that exposure to environmental toxins, such as heavy metals and pesticides, can contribute to the development of IBD. For example, exposure to arsenic has been linked to an increased risk of developing ulcerative colitis, while exposure to pesticides has been associated with an increased risk of developing Crohn's disease (Pánico et al., 2022). Colorectal cancer is another gut-associated disease that has been linked to environmental toxin exposure. Environmental toxins, such as polycyclic aromatic hydrocarbons and dioxins, have been shown

Table 1
Effect of Bisphenols on AGM (⇧- increase in abundance; ⇩- decrease in abundance)

BPA Effect on Animals Gut / Health	Dose	Studied Animal model	References
1. ⇧Bacteroides, Prevotellaceae, Erysipelotrichaceae, Akkermansia, Methanobrevibacter 2. Increased risk of IBD, colorectal cancer and development of metabolic disorders	50 g/kg feed Weight	**California mice (*Peromyscus californicus*)**	Javurek et al. (2016)
1. ⇩ Oscillospira and Ruminococcaceae 2. Reduced levels of SCFA and increased levels of systemic LPS	200 g of BPA/kg body weight/ day	**Rabbit offspring's**	Reddivari et al. (2017)
1. ⇩ Bifidobacteria, Firmicutes and Clostridium spp. 2. Decrease in faecal antimicrobial and lysozyme activity	50 g/kg	**C3H/HeN mice**	Malaisé et al. (2017)
1. Dominance of Proteobacteria, Actinobacteria and Hyphomicrobium 2. Decrease in body weight and serotonin levels	0, 2 and 20 μg/l	**Zebra fish (*Danio rerio*)**	Chen et al. (2018a)
1. Reduced levels of tryptophan and other metabolites that decreased colonic inflammation	50 μg/kg body weight/ day	**C57BL/6 mice**	Deluca et al. (2018)
1. ⇩Akkermansia and Proteobacteria ⇧ 2. Increase in intestinal permeability, endotoxins and inflammatory cytokines	50 μg/kg body weight/ day	**CD1 mice**	Feng et al. (2020)
1. Clostridiales, Dehalobacterium, Oscillospira, Ruminococcus, Clostridiales and decrease in levels of Odoribacter Alphaproteobacteria, Coprococcus, etc. 2. Effect on gut-brain axis	5 mg/kg and 50 mg/kg feed weight	**California mice (*Peromyscus californicus*)**	Kaur et al. (2020)
1. Significant increase in Oscillospira, Prevotella, Lachnospiraceae, Lactobacillus, Streptococcus, Dehalobacterium 2. Effect on oxidative phosphorylation, PPAR signalling, fatty acid metabolism	5 μg/kg/ day	**C57BL/6J Mice**	Diamante et al. (2021)

to be carcinogenic and are known to contribute to the development of colorectal cancer (Fan et al., 2021). In addition, exposure to heavy metals such as cadmium and lead has also been linked to an increased risk of developing colorectal cancer (Vitale & Gutovitz, 2023). Other gastrointestinal disorders, such as irritable bowel syndrome, have also been linked to environmental toxin exposure. Studies have shown that exposure to pollutants and toxins, such as benzene and toluene, can lead to gastrointestinal symptoms and contribute to the development of IBS (Järup, 2003). Overall, the evidence linking environmental toxin exposure to gut-associated diseases such as IBD, colorectal cancer, and others is growing. It is crucial to better understand the mechanisms by which environmental toxins impact gut health and to develop strategies to reduce exposure in order to protect against the development of these diseases.

Table 2
Effect of Phthalates on AGM⇧(- increase in abundance; ⇩- decrease in abundance)

Phthalates Effect on Animals Gut / Health	Dose	Studied Animal model	References
3. ⇩Firmicutes (*Bacilli*) in PND 62 Bacteroidetes (*Prevotella*), Elusimicrobia in PND 62 4. ⇧birth to adolescence (PND 62) in rats modified the gut microbiota	0.1735, 0.105, and 0.05 mg/kg/ day	**Sprague Dawley rats**	Hu et al. (2016)
1. ⇩Bifidobacteria, Firmicutes and Clostridium spp. 2. Decrease in faecal antimicrobial and lysozyme activity	500 mg/l	**Asian carp species silver (*Hypophthalmichthys molitrix*) and bighead (*Hypophthalmichthys Nobilis*)**	Kolb et al. (2019)
1. ⇧*Lachnoclostridium* (in vivo) *Alistipes, Paenibacillus*, and *Lachnoclostridium* (in vitro cultured cecal microbiota) 2. ⇩*Akkermansia, Odoribacter,* and *Clostridium sensu stricto* (*in vivo*) 3. *Decreased butyrate synthesis in 7-day exposure of 100 μM DEHP*	0, 10, or 100 μM DEHP in cecal contents (*in vitro*)	**C57Bl/6 mice (6- to 8-week-old)**	Lei et al. (2019)
3. ⇧Firmicutes; *Intestinimonas, Holdemanella, Coprobacter*, and *Parasutterella* 4. ⇩Verrucomicrobia; *Akkermansia, Tannerella*, and *Alloprevotella* genus 5. induced adipocyte hypertrophy and cholesterol overloading, deposition, and transportation	0 or 0.05 mg/ kg MEHP with normal diet or high-fat diet	**C57Bl/6 mice (4-week-old)**	Wang et al. (2019)
2. ⇩*Rothia spp.* and *Bifidobacterium longum* 3. decreased β-diversity, which may change immune responses in later life	Newborns who did not receive intravenous infusion (control) vs distress given intravenous infusions	**Newborn infants**	Yang et al. (2019)
1. Presence of Rothia, Adhaeribacter and Novosphingobium 2. Increased obesity due to increased biosynthesis of unsaturated fatty acids	20 mg DEHP/ day	**Zebra Fish (Danio rerio)**	Buerger et al. (2020)
3. ⇧*Prevotella Firmicutes and aproteobacteria*	500 mg/l	**C57Bl/6 mice**	Xiong et al. (2020)

(*continued on next page*)

Table 2 (*continued*)

Phthalates Effect on Animals Gut / Health	Dose	Studied Animal model	References
Desulfovibrio, Sutterella 4. ⇩Verrucomicrobia, of Oscillospira, Bacteroidetes, Parabacteroides Odoribacter, Akkermansia, and Helicobacter 3. ⇧*Firmicutes, Bacteroidetes, Verrucomicrobia, Turicibacter, Actinobacteria, and Epsilonbacteraeota* 4. Pathways of tyrosine, ubiquinone, amino acids, carbohydrates, steroids, nucleotides, tryptophan, etc. were significantly affected. Female reproductive toxicity	500 and 1500 mg/kg body weight	Mice	Fu et al. (2021)

Mechanisms and factors influenced by environmental toxins

Both direct and indirect mechanisms can have an impact on the gut microbiota when environmental toxins are present (Mendes et al., 2019). The gut microbiota is exposed to toxins directly through the direct channel, whereas the indirect pathway involves systemic effects on the host that may have an influence on AGM (Legan et al., 2022). By consumption of tainted food or water, inhalation of hazardous compounds, or skin absorption, the gut microbiota can be directly exposed to environmental contaminants. The exposure to different toxins, such as heavy metals, pesticides, and medications, can have an effect on the gut microbiota since it is in close touch with the outside world. Dysbiosis and changes in microbial metabolism can result from these toxins' ability to affect microbial populations (Chiu et al., 2020). Toxins from the environment can have indirect impacts on the gut microbiota by having a systemic impact on the host. Toxin exposure can alter the immune system and cause oxidative stress, inflammation, and other conditions that can have an effect on the gut flora. For instance, exposure to heavy metals can induce oxidative stress, which can change the populations of bacteria in the gut and decrease microbial diversity. Additionally, alterations in the host's food and way of life brought on by exposure to environmental contaminants might have an indirect effect on the gut microbiota. For instance, pesticide exposure may cause the variety of AGM to decline, which may affect the host's capacity to break down and absorb nutrients from food (Chen, 2021).

The effects of environmental toxins on AGM can be influenced by several factors, including the dose and duration of exposure, as well as individual susceptibility (Chiu et al., 2020). Dose and duration of exposure are important factors that can determine the extent of damage caused by environmental toxins on AGM. Higher doses of toxins over longer periods can lead to more severe dysbiosis and alterations in microbial metabolism. For instance, long-term exposure to heavy metals such as lead and cadmium can lead to significant changes in AGM, including a reduction in microbial diversity and alterations in microbial metabolism (Balali-Mood et al., 2021). Another significant aspect that may affect how environmental toxins affect the gut flora is individual vulnerability. Based on genetic and environmental variables, different people may have various degrees of vulnerability to the negative effects of toxins (Khan & Wang, 2020). Those who have genetic variants in genes that are involved in detoxification pathways, for example, may be more vulnerable to the negative effects of environmental contaminants (Santos et al., 2022). Apart from personal vulnerability, variables like age, sex, and underlying medical problems can also affect how environmental chemicals affect the gut flora. For instance, those with weakened immune systems and older adults may be more vulnerable to the negative effects of environmental pollutants on the gut flora (Claus et al., 2016). Furthermore, the type of environmental toxin and its specific mechanism of action can also impact its effects on AGM. Antibiotics, for instance, can specifically target certain microbial populations, altering their diversity and metabolism. In contrast, oxidative stress and alterations in the host's immune system caused by heavy

Table 3
Effect of Heavy metals on AGM(⇧- increase in abundance; ⇩- decrease in abundance)

Pesticides Effect on Animals Gut / Health	Dose	Studied Animal model	References
1. ⇧Burkholderiales, Bacteroidetes (male) 2. ⇩*Lachnospiraceae* (both),Firmicutes (male), 3. ⇩*Ruminococcaceae, Clostridiaceae*, and Erysipelotrichaceae (female)	4 mg/l in drinking water for 13 weeks (Diazinon)	**C57Bl/6 mice (4-week-old)**	Gao et al. (2017b)
1. ⇧*Acinetobacter* (females) *Capnocytophaga* (males and females) 2. ⇩Streptococcus (females)	1.0 μg/l atrazine dose (0.42 μg/l measured)	**Zebra Fish (Danio rerio)**	Chen et al. (2018b)
4. ⇧*Olsenella, Clostridium sensu stricto 1, Amphibacillus, Enterorhabdus, and Alloprevotella* (high-fat diet) 5. ⇩*Aerococcus, Brevundimonas, Trichococcus* (normal diet)	0.3 or 3 mg/kg by gavage daily (Chlorpyrifos)	**Wistar rats**	Fang et al. (2018)
6. ⇧*Actinobacteria, Bacteroidetes* 7. ⇩Verrucomicrobia, Proteobacteria	0.2–5 mg/kg orally (Carbendazim)	**Mice**	Jin et al. (2018)
4. ⇧*Bacteroidetes* 5. ⇩*Firmicutes, Butyricicoccus*	5 mg/kg/day oral dose (Glyphosate)	**Sprague Dawley rats**	Dechartres et al. (2019)
6. ⇧Erysipelotrichaceae, *Clostridium* 7. ⇩*Christensenellaceae, Coriobacteriaceae,* Bacillales, Anaerostipes, Roseburia	2 ppm (approximately 0.3 mg/kg bw/day) in drinking water for 13 weeks beginning at 8 weeks of age (Aldicarb)	**C57BL/6 mice**	Gao et al. (2019)
3. ⇧*Gilliamella apicola, Snodgrassella alvi* 4. ⇩*Lactobacillus*, Bifidobacterium	0.25 or 1.0 μg/kg in sugar syrup for 24–34 h (Fipronil)	**Honeybees**	Rouzé et al. (2019)
1. ⇧*Fusobacteria, Firmicutes* 2. ⇩Proteobacteria, Bacteroidetes, Alistipes, Akkermansia	100 or 1000 μg/l for 1, 7, or 21 days (Imazalil)	**Zebrafish**	Xiong et al. (2020)

Table 4
Effect of Pesticides on AGM(⇧- increase in abundance; ⇩- decrease in abundance)

Pesticides Effect on Animals Gut / Health	Dose	Studied Animal model	References
⇧ 4. Lactobacillaceae and Erysipelotrichaceae Within Erysipelotrichaceae family, Turicibacter, Blautia, Barnesiella, and Alistipes were higher in treatment group compared with control 5.⇩ Genus diversity in treatment group than control 6.⇩ Lachnospiraceae	100 and 500 ppm for 8 weeks in drinking water (Lead)	**Mice**	Breton et al. (2013)
3. ⇧Bacteroidetes, Clostridia 4. ⇩Firmicutes, Bacteroides	0, 10, or 250 ppb arsenite As(III) for 2, 5, or 10 weeks	**Mice**	Dheer et al. (2015)
6. Quantity of Firmicutes decreased significantly in the cecum contents after 10 weeks of Cd exposure) 7. ⇩Relative abundance of Firmicutes and γ-Proteobacteria	10 ppm in drinking water for 10 weeks (Cadmium)	**C57Bl/6 mice (4-week-old)**	Zhang et al. (2015b)
8. Bacteroidetes and Firmicutes shifted in response to Pb exposure 9. Male and female Pb exposure was highly correlated with increased adult body weight in male, but not female offspring	32 ppm until 40 weeks of age in maternal drinking water (Lead)	**Mice**	Wu et al. (2016)
8. ⇧Shewanella, Rheinheimera, and Bifidobacterium 9.⇩ Herpetosiphonales	Zinc restriction and 0, 50, 500 ppb inorganic arsenic in drinking water for 6 weeks	**Mice**	Gaulke et al. (2018)
1. ⇧Firmicutes 2. ⇩Fusobacteria, Cetobacterium, and Akkermansia muciniphila	0, 50, and 500 μg Cd/l in drinking water for 4 weeks(Cadmium)	***Cyprinus carpio***	Chang et al. (2019)
5. ⇧Firmicutes in MeHg treatment groups compared with control; Bacteroidetes in MeHg + sodium selenite compared with MeHg 6.⇩ Cyanobacteria and Bacteroidetes in MeHg treatment groups compared with control; Firmicutes in MeHg + sodium selenite compared with MeHg group	0 or 4 mg/kg bw MeHg	**Sprague Dawley rats**	Liu et al. (2019)
3. ⇧Butyricimonas, Dehalobacterium, Coprococcus, Oscillospira, and Bilophila 4. ⇩Sporosarcina, Jeotgalicoccus, Staphylococcus, and Acinetobacter	0 or 2 mg/kg bw HgCl2 for 90 days (Mercuric chloride)	**Kunming mice**	Ruan et al. (2019)

metals like arsenic can have an indirect effect on the gut microbiota (Jin et al., 2017).

Identifying environmental toxins with a high potential for AGM disruption

Identifying environmental toxins with a high potential for AGM disruption involves considering various factors, including the chemical structure of the toxin, bioaccumulation, and biomagnification. The chemical structure of a toxin plays a crucial role in determining its potential to disrupt AGM. Some toxins, such as heavy metals, are known to have a high affinity for microbial cells and can directly bind to and disrupt cellular functions. Other toxins, such as pesticides, may not directly target microbial cells but can indirectly impact AGM through their effects on the host (Galleher et al., 2020; Galmiche & Rassow, 2010). Toxins that accumulate over time in the tissues of living things are said to have undergone bioaccumulation. When creatures ingest polluted food or water, some pollutants, like persistent organic pollutants, have a high potential for bioaccumulation and can build up in their tissues. As a way, the body may be subjected to more toxins over time, which may cause the gut microbiota to be seriously disrupted. The process by which poisons accumulate in higher concentrations as they move through food chains is called as biomagnification. In contrast to organisms further down in the food chain, organisms at the top of the food chain, such as carnivorous fish, may have greater quantities of toxins in their tissues. As a result, consuming these organisms can lead to increased exposure to toxins and potentially more significant disruptions in AGM (Bertheau, 2011). Identifying environmental toxins with a high potential for AGM disruption is crucial for developing strategies to protect against their harmful effects. This involves not only considering the chemical structure of the toxin but also understanding the potential for bioaccumulation and biomagnification. Additionally, it is important to consider the pathways of exposure to these toxins, such as through food, water, or air, in order to identify the most effective strategies for reducing exposure and mitigating their effects on AGM (Du et al., 2023; Lee et al., 2023).

Biomarkers and assessment of AGM toxicity

The assessment of AGM toxicity and the development of specific biomarkers are necessary. An integration of animal models and meta-omics toolkit has been used to assess AGM toxicity, which mainly focuses on functional changes induced by exposure to various environmental chemicals. Developing biomarkers on a case-by-case basis is required, and these can be bacterial species, genes, or metabolites, and combinations of these markers. Signature changes in the gut microbiome upon exposure to certain chemicals could be used to indicate exposure to specific xenobiotics and the effect of these on human health. Recent studies have shown the potential for changes in gut microbial profiles to serve as biomarkers for gut microbiome toxicity associated with specific chemical exposures. Moreover, distinctive changes in functional profiles such as key metabolites and metabolic pathways could serve as more relevant biomarkers because alterations in functional profiles directly influence the host.

Strategies to mitigate the effects of environmental toxins on AGM

Prebiotics, probiotics, and dietary changes are just a few of the methods used to reduce the impact of environmental contaminants on the gut flora. Prebiotics are non-digestible fibers that selectively promote the growth and activity of beneficial gut microbes. By providing a food source for beneficial microbes, prebiotics can help to restore and maintain a healthy AGM (Nalage et al., 2016). Additionally, prebiotics can help to counteract the effects of environmental toxins by supporting the growth of beneficial microbes that can help to metabolize and eliminate toxins from the body (Hitch et al., 2022). Probiotics are living microbes that, when taken in sufficient quantities, can help the host's

health. Probiotics can assist in restoring the balance of AGM and reducing the negative effects of environmental toxins by introducing healthy bacteria into the gut. Certain probiotics have been demonstrated to have particular detoxification properties that can aid in the body's metabolization and elimination of pollutants (Plaza-Diaz et al., 2019). The impact of environmental pollutants on the gut microbiota can be lessened by dietary changes. A diet high in plant-based foods, for instance, can serve as a source of antioxidants and other nutrients that can assist to defend against the negative effects of pollutants. Also, eating foods high in fiber can stimulate the development of advantageous gut microorganisms and enhance gut health. Consuming fermented foods and avoiding processed and packaged foods that can include hazardous chemicals and preservatives are two other dietary treatments that may be useful in reducing the impact of environmental toxins on the gut flora (Deng et al., 2021). Prebiotics, probiotics, and dietary changes are all part of a multifaceted strategy used to lessen the impact of environmental contaminants on the gut flora. These measures can assist to mitigate the negative impacts of environmental pollutants and enhance general health and wellbeing by encouraging a healthy gut flora.

Regulatory aspects of environmental toxins

Regulatory aspects of environmental toxins are essential in ensuring public safety and minimizing the risks associated with exposure. These regulations involve the establishment of safety thresholds, exposure limits, and risk assessments to identify potential hazards and limit exposure to harmful toxins (Breton et al., 2014). Safety thresholds are established by regulatory agencies to identify the maximum level of exposure to a particular toxin that is considered safe for human health. These thresholds take into account various factors such as age, gender, and overall health status to ensure that vulnerable populations are adequately protected (Kleinbeck et al., 2011).

Exposure limits are established by regulatory agencies to limit the amount of exposure to a particular toxin that is deemed acceptable. These limits can be based on a range of factors, including the toxicity of the toxin, the route of exposure, and the potential for bioaccumulation and biomagnification. Risk assessments are conducted to identify potential hazards associated with exposure to environmental toxins. These assessments take into account factors such as the toxicity of the toxin, the level and duration of exposure, and the vulnerability of the exposed population. Based on these assessments, regulatory agencies can establish exposure limits and safety thresholds to protect public health. Regulatory agencies such as the Environmental Protection Agency and the Food and Drug Administration play a crucial role in ensuring the safety of the public with regard to exposure to environmental toxins. These agencies establish and enforce regulations to limit exposure to harmful toxins and promote public health and safety (Zaleski et al., 2016).

Future research directions and potential for therapeutic interventions

Future research on the impact of environmental toxins on AGM has the potential to identify new therapeutic interventions for gut-associated diseases. Personalized approaches to gut health are likely to be a key focus of future research, as individual variations in AGM can influence susceptibility to environmental toxins and the development of disease. These approaches may involve the use of precision medicine to identify specific microbial imbalances and targeted interventions to restore a healthy AGM (Song et al., 2018).

Targeted detoxification strategies may also become an area of focus for future research. These interventions may involve the use of specific dietary compounds or probiotics that can help to metabolize and eliminate toxins from the body. Additionally, novel approaches to toxin removal, such as the use of engineered bacteria, may become a promising area of research in the future.

Ecological restoration of AGM may also hold significant potential for therapeutic interventions. Approaches that aim to restore the natural diversity and composition of AGM, such as fecal microbiota transplantation, may be effective in mitigating the effects of environmental toxins on AGM. Additionally, approaches that focus on promoting a healthy gut environment through dietary interventions and lifestyle modifications may help to promote a more resilient AGM that is better able to withstand exposure to environmental toxins.

Charting the future: exploring key frontiers in gut microbiome research

Identifying and highlighting gaps in current research is crucial for advancing our understanding of the gut microbiome (AGM) and paving the way for future investigations. Here are some key areas where research on AGM may have gaps and future research needs:

1. *Long-term effects:* Most studies focus on short-term impacts of factors like diet, medication, or environmental toxins on AGM. There's a need for more long-term studies to understand how these factors shape AGM over time and their lasting effects on health.
2. *Interactions:* AGM doesn't exist in isolation; it interacts with various systems in the body, including the immune system, nervous system, and endocrine system. Future research should delve into these complex interactions to uncover how AGM influences and is influenced by other bodily systems.
3. *Human variation:* Research on AGM often lacks diversity, primarily focusing on Western populations. Future studies should encompass a wider range of demographics and ethnicities to understand how AGM varies across different human populations.
4. *Functional analysis:* While many studies examine the composition of AGM, there's a need for more functional analysis. Understanding what these microbes are doing and how they contribute to health or disease is critical.
5. *Aging:* The aging process can significantly impact AGM. Investigating how AGM changes with age and its implications for age-related diseases is an essential avenue for future research.
6. *Disease-specific studies:* More research should be directed toward specific diseases and disorders, such as irritable bowel syndrome (IBS), obesity, or autoimmune conditions, to determine the role of AGM in their development and progression.
7. *Interventions:* While some studies explore interventions like probiotics and dietary changes, more rigorous clinical trials are needed to establish the effectiveness of these interventions in modulating AGM and improving health outcomes.
8. *Technological advances:* Advancements in sequencing and analytical techniques continue to emerge. Researchers should leverage these technologies to gain deeper insights into AGM.
9. *Ethical considerations:* As research on AGM progresses, ethical considerations regarding interventions and the manipulation of AGM should be addressed.
10. *Data sharing:* Encouraging data sharing and collaboration among researchers is crucial to accumulate a more comprehensive understanding of AGM.
11. *Microbiome-host signaling:* Understanding how AGM communicates with the host and how these signals impact health and disease is an exciting area for future exploration.
12. *Therapeutic applications:* Investigate the potential of AGM-based therapies, including fecal microbiota transplantation, for various diseases.

Conclusion

The AGM plays a crucial role in maintaining human health, and exposure to environmental toxins can disrupt this delicate balance, resulting in gut-associated diseases. Several mechanisms through which environmental toxins affect AGM have been identified, and factors influencing their impact on AGM have been highlighted. Strategies like

prebiotics, probiotics, and dietary interventions can help mitigate the effects of these toxins. Regulatory aspects, such as establishing safety thresholds, defining exposure limits, and conducting risk assessments, are vital for managing environmental toxins. Future research directions, including personalized approaches, targeted detoxification methods, and ecological restoration of AGM, hold promise for preventing and treating gut-related diseases. A deeper understanding of how environmental toxins affect AGM can lead to the development of effective interventions that promote gut health and overall wellbeing. While substantial progress has been made in comprehending AGM's role in human health, several gaps and unexplored areas remain. Future research endeavors should focus on addressing these gaps to unlock AGM's full potential in enhancing human health and wellbeing.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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STUDY ON PREVALENCE OF THE CESTODE PARASITES OF FRESHWATER FISH, *MASTACEMBELUS ARMATUS* FROM NASIK DISTRICT, (M.S.), INDIA

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Abstract

The present study deals with the survey of two Piscean cestode parasites viz. Senga sp. and Lytocestus sp.collected from the intestine of Mastacemelus armatus at different collection sites of Nasik district (M.S.) India during June, 2016 to May, 2017. The high incidence of infection of these species Senga sp. and Lytocestus sp. were recorded in summer season(75.00 %, & 65.00 % respectively) followed by winter season (45.83 %, &50.00 %respectively) whereas Infection was low in monsoon season (22.72%, & 31.81 % respectively).The results of present study clearly indicate that environmental factors, quality and quantity of water effect on the seasonality of parasitic infection.

Keywords Cestode Parasites, Mastacembelus armatus, Senga sp. Lytocestus sp., Nasik.

Introduction

Fishes are important components of ecosystem from ecological, medicinal, nutritional and economical point of view. These fishes are parasitized by helminth parasites, which reduce the food value of host fish. Study of helminth parasites is therefore an important needs of nowdays. Helminth infections are very common in people who consume improperly cooked meat, unhygienic habits and poor sanitation. These helminthic infection leads to various disorders. No work has been done on cestodes parasites of freshwater fishes in Nasik district, M.S. India.

Population investigation is necessary to provide data for the prediction of integrated methods to achieve the regulation of numbers of harmful parasites (Kennedy, 1974) Notable contribution made by Dobson (1994), Dogiel et al. (1935, 1958), Anderson (1976). Results of present study, therefore, are expected to be helpful for future research on piscian cestodes in this region. Keeping in view, the importance of these Piscean cestode parasites, present study was undertaken to investigate and evaluate prevalence of cestode parasites of freshwater fish *Mastacembelus armatus* and distribution of two Piscean cestodes of genus *Senga sp. and Lytocestus sp.* collected during annual cycle June, 2016 to May, 2017.

Materials and Methods

Study area

Study was conducted in different collection sites of Nasik district.

In the present study, intestines of *Mastacembelus armatus* were examined for cestode infection during the period of June, 2016 to May, 2017 from Nasik Region, M. S. India. Cestodes were collected, preserved in 4% formalin, dehydrated in various alcoholic grades, stained with Borax carmine, cleared in xylene and mounted in D.P.X. These Cestodes were identified by standard methods (Yamaguti, S.). On taxonomic observations the Cestodes are identified as *Senga sp. and Lytocestus sp.* The data obtained throughout year were recorded; processed to derive biological parameter incidence for study of seasonal variation by using following formula.

$$\text{The \% incidence of infection} = \frac{\text{Infected Host} \times 100}{\text{Total Host Examined}}$$

Results and Discussion

Results of the present study on prevalence of fish cestodes are presented in Table 01 and 02. Two species of cestode parasites was recorded as *Senga sp. and Lytocestus sp.* It was found that, high incidence of infection of all these species were recorded in summer (75.00% &65.00%) followed by winter (45.83% &50.00%) whereas infection was low in monsoon season (22.72% & 31.81%). According to the Kennedy (1971, 1975 and 1977) and Rodhe (1993) the temp, humidity and rainfall, feeding habits of host, availability of infective host and parasite maturation, such factors are responsible for influencing the parasitic infections.

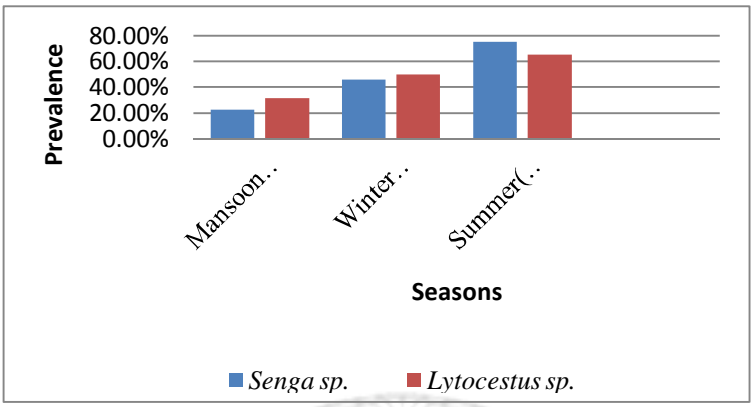
Table 1: Prevalence of *Senga sp.* of *Mastacembelus armatus* during June, 2016 to May, 2017.

Seasons	No. of Host Examined	No. of Host Infected	No. of Parasites Collected	Incidence
Mansoon(June 2016-Sept. 2016)	22	05	07	22.72
Winter (Oct. 2016-Jan. 2017)	24	11	15	45.83
Summer (Feb. 2017-May 2017)	20	15	19	75

Table 2: Prevalence of *Lytocestus sp.* of *Mastacembelus armatus* during June, 2016 to May, 2017.

Seasons	No. of Host Examined	No. of Host Infected	No. of Parasites Collected	Incidence
Mansoon (June 2016-Sept. 2016)	22	07	08	31.81
Winter (Oct. 2016-Jan. 2017)	24	12	14	50
Summer (Feb. 2017-May 2017)	20	13	17	65

Graph showing prevalence of *Senga sp*. and *Lytocestus sp*. from *Mastacembelus armatus*.



Conclusion

In the present research study, recorded data shows high incidence of infections of these two cestode species were recorded in summer (Feb., 2017-May, 2017) followed by winter (Oct., 2016-Jan., 2016) where as low in monsoon season (June, 2016 –Sept., 2016). The results of present study clearly indicated that the environmental factors, quality and quantity of water effect on the seasonality of parasitic infection.

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