INDIAN MATHEMATICAL SOCIETY

INDIAN MATHEMATICAL SOCIETY

(Founded in 1907; Reg. No. S-550, Delhi)
Registered Office: Department of Mathematics,
Savitribai Phule Pune University, Pune-411007

http://www.indianmathsociety.org.in

NEWSLETTER

NO. 39

March / April 2018

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Facsimile of the Commemorative Postage Stamp on the 'Indian Mathematical Society' issued by the Department of Posts (Philately Division, Government of India, to mark the completion of hundred years of the Society. Released on the Inaugural day of the Platinum Jubilee 75th Annual Conference of the Society on 27th December 2009.

CONTENTS

IMPORTANT EVENTS

(1) The ensuing 84^{th} Annual Conference of the Society will be held under the auspices of Shri Mata Vaishno Devi University (SMVDU), Jammu during November 27-30, 2018. Prof. A. K. Das, Department of Mathematics, SMVDU, will be the Local Organizing Secretary of the conference. His email id is *ak.das@smvdu.ac.in*

(2) Prof. Sudhir Ghorpade, Department of Mathematics, IIT, Mumbai has been elected as the President of the Indian Mathematical Society for a period of one year with effect from April 1, 2018.

(3) Prof. Sanjib Kumar Datta, (University of Kalyani, Kalyani, W.B.); Prof. Asma Ali, (Aligarh Muslim University, Aligarh); and Prof. G. P. Raja Sekhar, (IIT, Kharagpur) have been elected as members of the Council for a period of three years with effect from April 1, 2018.

(4) Prof. A. K. Agarwal Award for the year 2016 has been awarded to Sudhanshu Sekhar Rout, Department of Mathematics, National Institute of Technology, Rourkela, Odisha, for his research paper Balancing non-Wieferich primes in arithmetic progression and abc conjecture published in Proc. Japan Acad., 92, Series A (2016).

(5) Prof. A. M. Mathai Award for best research paper published in the year 2016 (in the area of Applicable Mathematics) has been awarded to Mr. Abhik Ghosh, Interdisciplinary Statistical Research Unit, Indian Statistical Institute, Kolkata for his paper Divergence based robust estimation of the tail index through an exponential regression model published online on 18 July 2016 in Stat Methods Applications.

(6) P. L. Bhatnagar Memorial Prize for 2017 is given to Anant Mudgal (Faridabad), Shubham Saha (Ranchi) and Yash Sanjeev (Kota). The 58^{th} International Mathematical Olympiad (IMO) was held in Rio de Janeiro, Brazil from July 12 to 23, 2017. In the Indian team the above three students were top scorer (each of them scored 18 points) at IMO.

(7) A. Narasinga Rao Memorial Prize for the year 2015 is awarded to Dinesh Kumar, Deen Dayal Upadhyay College, University of Delhi, Delhi 110 007 for his research paper entitled 'On dynamics of semiconjugated entire functions published in the JIMS Vol. 82 (1-2), 2015, pp 53-59.

(8) A. Narasinga Rao Memorial Prize for the year 2016 has been awarded to Abhishek T. Bharadwaj, Chennai Mathematical Institute, H1 SIPCOT Park, Siruseri Kelambakkam, Chennai-603103 for his research paper entitled Fatou's Lemma and integrability criteria in number fields published in The Mathematics Student, Vol. 85 (3-4), 2016. pp 25-32.

(9) The Volumes 84 (2017) and 85 (2018) of JIMS have been published online on the website of the Informatics publishing Limited, Bangalore. These volumes have been uploaded on the Informatics India's I-scholar platform.

(10) The last date for submitting papers for Prof. A. K. Agarwal Award, Prof. A. M. Mathai Award and Prof. Satish Bhatnagar Award for the year 2017 is June 30, 2018. The details are available on the website of the Society (www.indianmathsociety.org.in).

(11) The International Congress of Mathematicians (ICM) will take place in Rio de Janeiro, Brazil during August 1 - 9, 2018. The detailed information is available on the website of the congress: http://www.icm2018.org.

HIGHLIGHTS OF THE 83^{rd} ANNUAL CONFERENCE OF THE IMS

The 83^{rd} Annual Conference of the Indian Mathematical Society was held at the Department of Mathematics, Sri Venkateswara University, Tirupati, Andhra Pradesh during December 12- 15, 2017 under the president-ship of Prof. Manjul Gupta. The Conference was attended by more than 200 delegates. Two presidential addresses (General and Technical), one plenary lecture by Prof. Fridrich Wehrung, University de Caen, France, five Memorial Award lectures and nine invited lectures were delivered in the conference. Also, six symposia were organized during the conference and thirty invited speakers gave talks in the symposia. Moreover, in all 117 research papers were accepted for presentation at the Conference including 19 research papers for the paper presentation competition for various prizes.

The Conference was inaugurated by Prof. A. Damodaram, Vice Chancellor, Sri Venkateswara University, Tirupati. The function was presided over by Prof. Manjul Gupta. Prof. S. Sreenadh, Head, Department of Mathematics and Local Organizing Secretary of the Conference welcomed the delegates. The General Secretary of IMS, Prof. N. K. Thakare spoke about the Indian Mathematical Society and on behalf of the Society expressed his sincere and profuse thanks to the host for organizing the Conference. Prof. Peeyush Chandra, Academic Secretary of IMS, reported the academic programmes of the Conference.

Prof. Manjul Gupta delivered her Presidential address (General) on the topics Lilavati's sutras and their applications. The function ended with a vote of thanks by the Local Organizing Secretary.

Prof. Manjul Gupta gave Presidential address (Technical) on Some Topics in Functional Analysis: our contributions with emphasis on holomorphy which was presided over by Prof. N. K. Thakare, General Secretary of the Indian Mathematical Society.

Prof. Fridrich Wehrung, University de Caen, France gave a **plenary talk** on Ranges of Functors in Algebra.

The 31^{st} **P. L. Bhatnagar Memorial Award Lecture** was delivered by Prof Pradeep G Siddeshwar, Bangalore University, Bangalore on Understanding understood instabilities in fluids.

The 28^{th} **V. Ramaswami Aiyar Memorial Award Lecture** was delivered by Prof. H. K. Mukherjee, NEHU, Shillong on Classification of manifolds different shades.

The 28^{th} **Srinivasa Ramanujan Memorial Award Lecture** was delivered by Prof. Amritanshu Prasad, IMSc, Chennai on The timed plastic monoid.

The 28^{th} **Hansraj Gupta Memorial Award Lecture** was delivered by Prof. Atul Dixit, IIT Gandhinagar on Modular-type transformations and integrals involving the Riemann Ξ-function.

The $13^{1}th$ **Ganesh Prasad Memorial Award Lecture** was given by prof. P. V. Jain, R. D. University, Jabalpur on the topic Approximation by spline functions and its applications.

A. Narasinga Rao Memorial Prize for the year 2015 has been awarded to Dinesh Kumar, Deen Dayal Upadhyay College, University of Delhi, Delhi 110 007 for his

research paper entitled On dynamics of semiconjugated entire functions published in the JIMS Vol. 82 (1-2), 2015, pp 53-59.

A. Narasinga Rao Memorial Prize for the year 2016 has been awarded to Abhishek T. Bharadwaj, Chennai Mathematical Institute, H1 SIPCOT Park, Siruseri Kelambakkam, Chennai-603103 for his research paper entitled Fatou's Lemma and integrability criteria in number fields published in The Mathematics Student, Vol. 85 (3-4), 2016. pp 25-32.

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Prof. A. M. Mathai Award for best research paper published in the year 2016 (in the area of Applicable Mathematics) has been awarded to Mr. Abhik Ghosh, Interdisciplinary Statistical Research Unit, Indian Statistical Institute, Kolkata for his paper Divergence based robust estimation of the tail index through an exponential regression model published on line on 18 July 2016 in Stat Methods Applications.

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Various prizes for the Paper Presentation Competition:

For the IMS prizes 19 papers were received : one in Group 1, four in Group 4, eight in Group 5, two each for AMU Prize and V M Shah Prize. No paper was received for Groups 2 and 3. The papers were presented in the competition section with two parallel sessions - Session one included papers for AMU, V M Shah Prize, Group 1 and Group 4, while Session two included papers for Group 5. The judges for the two sessions were different.

Following is the result for the award of these prizes.

IMS Prize - Group-1: There was one presentation and the prize was awarded to Usha K. Sangle Swami Ramanand Tirth Marathwada University, Nanded, Maharashtra.

IMS Prize - Group-2: No paper was received in this group.

IMS Prize - Group-3: No paper was received in this group.

IMS Prize - Group-4: Four papers were presented in this group and the prize was awarded to Rachana Desai, K. J. Somaiya College of Engineering, Mumbai.

IMS Prize - Group-5: Eight papers were presented in this group and the prize was awarded to Veena B. N., Bangalore University, Bangalore.

AMU Prize: Two papers were received and presented. The prize was awarded to Sumana Hatui, HRI, Allahabad.

V M Shah Prize: Two papers were received and presented. However, neither was recommended for the prize.

Invited Lectures delivered

One hour Talk

1. Prof. Fridrich Wehrung, University de Caen, France gave a plenary talk on Ranges of Functors in Algebra.

Half hour Talks

1. Prof M. Mursaleen, AMU, Aligarh -Approximating functions by summability methods
2. Prof Mohammd, Ashraf, AMU, Aligarh - Nonlinear higher derivativations on Algebras with Applications
3. Prof A. K. Das, SMVD University, Jammu - Factorizations of some topological properties
4. Prof Ranjan Jana, SVNIT, Surat - Extended Wright type hypergeometric functions: some recent developments
5. Prof P. D. Srivastava, IIT Kharagpur -Spectrum and fine spectrum of n band triangular matrices
6. Prof Om Ahuja, Kent State University, USA - The impact of the 21st century modern technologies in conventional, blended and web-based teaching and learning college mathematics
7. Prof Srinivas, I. M. Sc., Chennai- Euclidean algorithm in number fields
8. Prof David Levin, Tel Aviv University- Non-stationary extensions of Banach fixed-point theorem, with applications to fractals

As per convention the winners of A. Narsinga Rao Memorial Prize for 2015 and 2016, Prof. A K Agarwal Award for 2016 and Prof. A. M. Mathai Award for 2016 were also invited to give half an hour talk.

Symposia organized

Six symposia were organized and the details are as follows.

1. Function Spaces and Inequalities
Speakers : E. Malkowsky, Serbia; M. Mursaleen, AMU; R. Radha, IIT Madras; A. Sofi, Srinagar; Arun Pal Singh, New Delhi; Pankaj Jain, SAU, New Delhi (Convener).

2. Mathematical Biology
Speakers : Girija Jayaraman, (Retd), IIT, Delhi; Mini Ghosh, VIT, Chennai; Debaldev Jana, SRM, Chennai; G Radhakrishnamacharya, NIT, Warangal; Maithly Saran, IIT, Delhi; P Kandaswamy, Coimbatore (Convener).

3. Interactions of Algebra and Discrete Mathematics
Speakers : Matjaz Kovse, IIT, Bhubeneshwar; Y. M. Borse, S. P. Pune University; Manoj Changat, University of Kerala; Lavanya Sivkumar, IIT (BHU); B. N. Waphare S. P. Pune University (Convener).

4. Group Theory
Speakers : G. K. Bakshi, Panjab University; Chandigarh, N S N Sastry, IIT, Dharwad; P. Sankaran, IMSc.Chennai; B. Sury, ISI, Bangalore; Manoj K. Yadav, HRI, Allahabad (Convener).

5. Emerging Topics in Differential Equations
Speakers : V. Raghavendra, IIT, Trupati; Varsha Daftardar-Gejji, S P Pune Univ.; Nandakumaran, IISc, Bangalore; K. Sakthivel, IISST, Trivendrum; S. Abbas, IIT, Mandi (Convener).

6. Dynamics, Chaos and Fractals
Speakers : Sunita Gakkhar, IIT, Roorkee; A. K. B. Chand, IIT, Madras; Srijanani A. Prasad, IIT, Tirupati; Tarakanta Nayak, IIT, Bhubaneswar; Prof. M. Guru Prem Prasad, IIT, Guwahati (Convener).

MINUTES OF THE 83^{rd} ANNUAL GENERAL BODY MEETING OF THE INDIAN MATHEMATICAL SOCIETY

The 83rd Annual General Body Meeting of the Indian Mathematical Society was held on Friday, the 15^{th} December, 2017 at 12 noon in the Lecture Hall of the Department of Mathematics, Sri Venkateswara University, Tirupati (A. P.) under the presidentship of Prof. Manjul Gupta.

The following business was transacted.

Item No. 1: To confirm the Minutes of the General Body meeting held on Friday, the 30^{th} December, 2016 at 12 noon in the Lecture Hall of the University of Kalyani, Kalyani, West Bengal under the presidentship of Prof. D. V. Pai.

The Minutes of the General Body meeting held on December 30, 2016 at 12 noon at University of Kalyani, Kalyani, West Bengal were confirmed.

Item No. 2 : To receive the report of the General secretary for the year 2017.

Report of the General Secretary for the year 2017.

1. The IMS News Letters No. 37 and No. 38 were published in March 2017 and in August 2017, respectively. These are also displayed on the website of the Indian Mathematical Society. The soft copies of these News Letters have been sent by e-mails to all the members of the Society.

Prof. Manjul Gupta was informed that she has been elected as the president of IMS for one year with effect from April 1, 2017. The elected council members were intimated of their elections to the council of the IMS. Letters of thanks were sent to the council members and the President of the IMS who retired on March 31, 2017.

2. The meeting of the Academic Planning Committee for the IMS Conference 2017 was held on Sunday, the 2^{nd} July, 2017 from 11.00 a.m. to 1.00 p.m. in the conference room of the Guest House of the Savitribai Phule Pune University, Pune. The meeting was presided over by Prof. Manjul Gupta, the president of the IMS The names of the speakers for the five memorial award lectures, plenary talks, invited talks, list of symposia and their conveners were finalized in the meeting.

3. A. Narasinga Rao Memorial Prize for the year 2015 is awarded to Dinesh Kumar, Deen Dayal Upadhyay College, University of Delhi, Delhi 110 007 for his research paper entitled On dynamics of semiconjugated entire functions published in the JIMS Vol. 82 (1-2), 2015, 53-5.

4. A. Narasinga Rao Memorial Prize for the year 2016 has been awarded to Abhishek T. Bharadwaj, Chennai Mathematical Institute, H1 SIPCOT Park, Siruseri Kelambakkam, Chennai-603103 for his research paper entitled Fatou's Lemma and

integrability criteria in number published in The Mathematics Student, Vol. 85 (3-4), 2016. pp 25-32.

5. Prof. A. K. Agarwal Award for the year 2016 has been awarded to Sudhanshu Sekhar Rout, Department of Mathematics, National Institute of Technology, Rourkela, Odisha, for his research paper Balancing non-Wieferich primes in arithmetic progression and abc conjecture published in Proc. Japan Acad., 92, Series A (2016).

6. Prof. A. M. Mathai Award for best research paper published in the year 2016 (in the area of Applicable Mathematics) has been awarded to Mr. Abhik Ghosh, Interdisciplinary Statistical Research Unit, Indian Statistical Institute, Kolkata for his paper Divergence based robust estimation of the tail index through an exponential regression model published online on July 18, 2016 in Stat Methods Applications.

7. Only one paper was received for Prof. Satish Bhatnagar Award for the year 2016. However, the paper did not meet the conditions formulated to give the award and therefore the award is not given to any one.

8. P. L. Bhatnagar Memorial Prize for 2017 is given to Anant Mudgal (Faridabad), Shubham Saha (Ranchi) and Yash Sanjeev (Kota). The 58th International Mathematical Olympiad (IMO) was held in Rio de Janeiro, Brazil from July 12 to 23, 2017. In the Indian team the above three students were top scorer (each of them scored 18 points) at IMO.

9. Digitization of 43 back volumes of JIMS published from the year 1911 to the year 1976 have been completed by the Informatics Publishing Ltd., Bangalore. The digitized volumes are available at online. The JIMS volumes published from the year 1977 to the year 2004 have been retrieved from the IMS Library housed at Ramanujan Institute for Advanced Study in Mathematics, Madras University, Chennai. These volumes have been handed over to the representative of the Informatics Publishing Ltd. The digitization of these volumes is expected to be completed within the next two months.

10. During the year of the report 164 new life members of IMS have been enrolled, and 67 persons became Annual/ Sessional members.

11. A timely guidance and the help has been provided to Prof. S. Sreenadh, Local organizing secretary of the 2017 IMS conference pertaining to raising of funds, local arrangements and inaugural function of the conference.

12. Each Life Member of the Society is now allotted a Permanent Membership Number. The complete list of Life Members of the Society is now available on the IMS website.

13. The complete catalogue of the back volumes of the periodicals published by the Society as well as those received in exchange by the Society and available in the IMS Library, Chennai is now available on the IMS website.

14. The General Secretary thanks Prof. J. R. Patadia for maintaining and updating the website of the IMS.

15. The General Secretary thanks Prof. M. M. Shikare and Prof. S. K. Nimbhorkar for extending substantial help in performing the duties of the general secretary.

Item No. 3 : To receive the Report of the Academic Secretary 2017.

Based on the deliberations during the APC meeting held on July 2, 2017 at the S. P. Pune University, Pune and in consultations with the General Secretary, the

speakers for Plenary talk, Memorial Award Lectures and Invited talks were finalized and letters of invitation were sent to the following:

Memorial Award Lectures

1. 31st P. L. Bhatnagar Memorial award lecture: Prof Pradeep G Siddeshwar, Bangalore University, Bangalore
2. 28th Hansraj Gupta Memorial award lecture: Prof. Atul Dixit, IIT Gandhinagar
3. 28th Srinivasa Ramanujan Memorial award lecture: Prof Amritanshu Prasad, IMSc, Chennai
4. 28th V. Ramaswamy Aiyer Memorial award lecture: Prof. H. K. Mukherjee, NEHU, Shillong
5. 13th Ganesh Prasad Memorial award lecture: Prof P. V. Jain, RD University, Jabalpur

Plenary Talks: Prof F. Wehrung (France)

Invited Speakers for Half an hour talks:

Prof M. Mursaleen, AMU, Aligarh
Prof Mohd, Ashraf, AMU, Aligarh
Prof A. K. Das, SMVD University, Jammu
Prof Ranjan Jana, SVNIT, Surat
Prof Y. M. Borse, S. P. Pune University
Prof. P. D. Srivastava, IIT, Kharagpur
Prof . Om Ahuja, Kent State University, USA
Prof. Srinivas, I M Sc, Chennai
Prof. David Levin, Tel Aviv University

Following symposia were finalized with conveners as mentioned below:

1. Functions spaces and Inequalities : Convener - Prof Pankaj Jain, SAU New Delhi
Speakers : E. Malkowsky, Serbia; M. Mursaleen, AMU, Aligarh; R. Radha, IIT, Madras; A. Sofi, Srinagar; Arun Pal Singh, New Delhi; Pankaj Jain, SAU, New Delhi.

2. Mathematical Biology: Convener - Prof P. Kandaswamy, Coimbatore
Speakers : Girija Jayaraman, (Retd) IIT Delhi; Mini Ghosh, VIT Chennai; Debaldev Jana, SRM, Chennai; G Radhakrishnamacharya NIT Warangal; Maithly Saran, IIT' Delhi; P Kandaswamy, Coimbatore.

3. Interactions of Algebra and Discrete Mathematics: Convener - Prof. B. N. Waphare, S. P. Pune University.
Speakers : Matjaz Kovse, IIT, Bhubeneshwar; Pratima Panigrahi, IIT, Kharagpur; Manoj Changat, University of Kerala, Lavanya Sivkumar, IIT (BHU); B. N. Waphare S. P. Pune University

4. Group Theory: Convener - Dr Manoj K. Yadav, HRI, Allahabad
Speakers : G. K. Bakshi, Panjab University, Chandigarh; NSN Sastry, IIT Dharwad; P. Sankaran, IMSc, Chennai; B. Sury, ISI, Bangalore; Manoj K. Yadav, HRI, Allahabad

5. Emerging Topics in Differential Equations: Convener - Prof. S. Abbas, IIT Mandi
Speakers : V. Raghavendra, IIT, Tirupati; Varsha Daftardar-Gejji, S P Pune Univ.; A. K. Nandakumaran, IISc Bangalore; K. Sakthivel, IISST, Trivendrum; S. Abbas, IIT Mandi.

6. Dynamics, Chaos and Fractals: Convener - Prof M. Guru Prem Prasad, IIT Guawahati
Speakers : Sunita Gakkhar, IIT Roorkee; A. K. B. Chand, IIT, Madras; Srijanani A. Prasad, IIT, Tirupati; Tarakanta Nayak, IIT Bhubaneswar; Prof. M. Guru Prem Prasad, IIT, Guwahati.

Papers for Competition section - 17 papers were received for competition section: It was proposed that we should have two parallel sessions for competition this year Session one for AMU, V M Shah Prize, Group 1 and Group 4, Session 2 for Group 5.
Contributory Papers 100 papers were received for oral presentations.

Item No. 4: To receive the report of the Administrative Secretary for the year 2017.
Report of the Administrative Secretary for the year 2017.

1. E-mails of thanks and appreciation were sent to the local organizing secretary and the convener of the 82nd Annual Conference of IMS held in December 2016 at University of Kalyani, Kalyani, West Bengal. Elected council members were informed of their elections as members of the IMS council.

2. The Minutes of the Council Meeting and the General Body meeting held at the University of Kalyani, Kalyani were prepared.

3. Arrangements were made for holding the meeting of the Academic Planning Committee on Sunday, the 2nd July, 2017 from 11.00 am onwards in the conference room of the Guest House of the Savitribai Phule Pune University, Pune (SPPU). Local Hospitality and travel arrangements were made for the delegates attending the meeting.

4. The print copies of JIMS Volume 84, nos. 1-2 (January June 2017) and JIMS Volume 84, nos. 3-4 (July Dec. 2017) were received from Parashuram Process, Pune and preserved in the Library of the Mathematics Department, Savitribai Phule Pune University, Pune. The camera ready copies of The Math. Student, Vol. 86 (1-2), 2017, and The Math. Student, Vol. 86 (3-4), 2017, were forwarded to the Parshuram Process for the purpose of printing. The printed copies have been received from the press and preserved in the Library of Math. Dept., SPPU.

5. The copies of JIMS Vol. 84 (Nos. 1-2) (2017), Vol. 84 (Nos. 3-4)(2017) and The Mathematics Student Vol. 86 (Nos. 1-2) (2017) have been sent to the subscribing institutes and Universities by registered post. The account of corresponding expenses has been maintained.

6. The Director, Ramanujan Institute for Advanvced Study in Mathematics, University of Madras, Chennai was requested to provide the old volumes of JIMS for digitization. The volumes published from 1977 to 2004 have been received from the Institute. They have been handed over to the Informatics Publishing Ltd. (Bangalore) for digitization.

7. Substantial help was rendered to the General Secretary Prof. N. K. Thakare in the finalization of Newsletter Nos. 37 and 38. The Newsletters were prepared and sent by e-mails to the Life members of the IMS.

8. Assistance was provided to the General Secretary in the process of selecting the mathematicians for Prof. A. K. Agarwal award for the year 2016, Prof. A. M. Mathai award for 2016, A. Narsinga Rao memeorial prize for the years 2015 and 2016 and Prof. Satish Bhatnagar award for 2016.

9. The invitations were sent to Anant Mudgal (Faridabad), Shubham Saha (Ranchi) and Yash Sanjeev (Kota) for attending the Inaugural function of IMS conference to be held on December 12, 2017 in Tirupati and receiving the P. L. Bhatnagar memorial prize awarded to them for the year 2017.

10. The records / documents such as minutes of the council meeting, minutes of the general body meeting, copies of the News Letters, copies of agenda for council meeting, General body meeting etc. have been maintained.

Item No. 5: To consider the Audited Statement of Accounts for the year 2016 -2017 and budget for the year 2018 -2019. The Audited Statement of Accounts for the year 2016- 2017 and budget for the year 2018- 2019 presented by the Treasurer, Prof. S. K. Nimbhorkar were approved.

Item No. 6: To receive the report of the Editor, The Journal of the Indian Mathematical Society for 2017.

Report of the Editor, Journal of the Indian Mathematical Society (2017).

Manuscript Status:

(a) Number of papers pending with the referee or under process at the end of 2016: 17
(b) Number of manuscripts received during the year 2017: 115
Total: 132
(i) Number of Manuscript accepted during 2017: 31
(ii) Number of manuscript rejected during 2017 : 71
(ii) Number of manuscript with the referees / under process: 30
Total: 132
Increase in the number of submissions: The papers submitted to the JIMS are received directly by the chief editor or they are received online by the IPl on their platform. The number of submissions has therefore increased from 70 in 2016 to 115 in 2017. On the other hand, the number of rejections has also increased from 40 to 71. The number of submissions from countries like Russia, Iran, Egypt, Bangladesh, China and other foreign countries is noteworthy.

Digitization of the back-Volumes of JIMS: The Informatics Private Ltd. (IPL) has already digitized and put a large number of back volumes of the JIMS on line. Those available at the S. P. Pune University have been done. The remaining volumes are being procured from our Chennai library and given to the IPL for completing the full digitization work of JIMS from 1907 onwards.

Publication Status (online by IPL):

1. Volume 84 (1 - 2) 2017 of JIMS was published on Jan 1, 2017.
2. Volume 84 (3 - 4) 2017 of JIMS was published on July 1, 2017.
3. Volume 85 (1-2) 2018 of the JIMS will be published on Jan. 1, 2018.

Publication Status (Print by the IMS):

1. Volume 84 (1 - 2) 2017 of JIMS was published in February, 2017 and sent to the subscribers by the Administrative Secretary, IMS.
2. Volume 84 (3-4) 2017 of JIMS was published in August, 2017 and sent to the subscribers by the Administrative Secretary, IMS.
3. Volume 85 (1-2) 2018 of the JIMS will be published on January 1, 2018 and sent to the subscribers soon.

Acknowledgements:

The Chief Editor, JIMS puts on record his grateful thanks to the members of the Editorial Board of JIMS, referees of research papers from India and abroad for their assistance and support to JIMS. The editor also expresses his sincere thanks to the Treasurer of IMS, Prof. S. K. Nimbhorkar and the Administrative. Secretary Prof. M. M. Shikare for extending possible help printing and dispatching of the JIMS to the subscribers of the Journal.

Item No. 7: To receive the report of the Editor, Mathematics Student for 2017. Report of the Editor of The Mathematics Student for 2017.

Publication Status:

The soft copy of the Vol. 86, Nos. 1- 2, January-June (2017) of The Mathematics Student was sent on line in June 2017 and that of the Vol. 86, Nos. 3- 4, July-December (2017) of The Mathematics Student was sent on line during November 30-December 5, 2017 to all the Life Members (who have registered their E-mail id on line on imsgoesgreen@gmail.com or jamanadaspat@gmail.com or sknimbhorkar@gmail.com) at their registered E-mail addresses. Both these soft copies are available on the Societys website as well.

There is no backlog as regards to the publication of the Mathematics Student.

Manuscript Status:

52 manuscripts are received during the period from December 24, 2016 to December 08, 2017 and 12 manuscripts were reported as pending with the referees in the last report.

Of these total 64 manuscripts, 20 are accepted, 34 are not accepted and 10 are pending with the referees.

Acknowledgements:

We take this opportunity to put on record our sincere thanks and profuse gratefulness to Members of the Editorial Board and the learned referees for their continuous support and assistance in our sustained efforts for timely publication of the Mathematics Student. The Society looks forward to the active assistance in the constructive reviewing work as well as quality contributions from the large pool of mathematicians from India and abroad.

We also expresses our sincere thanks to the Administrative Secretary Prof. M. M. Shikare and the Pune Press for their assistance in getting the Vol. 86, Nos. 1-2, January-June (2017) as well as the Vol. 86, Nos. 3-4, July-December (2017) of the Mathematics Student printed, and thus in its timely publication.

Call for contributions: Contributions are welcome and are assured of all the sincere efforts for prompt processing.

Item No. 8: To consider the venue of the 84th Annual Session of the society to be held in 2018. The General Body accepted the invitation from the Vice Chancellor, Shri Mata Vaishno Devi University (SMVDU), Jammu for organizing the 84th Annual Conference of the Indian Mathematical Society. Prof. A. K. Das, Department of Mathematics, SMVDU, will be the Local Organizing Secretary of the conference.

Item No. 9: Announcements of the results of the following elections:
(i) President for the year 2018-2019;

(iii) Three members of the Council for a period of three years w. e. f. April 01, 2018.
The returning officer Prof. M. M. Shikare reported that the following members are declared elected. President for 2018-19 : Prof. Sudhir Ghorpade, IIT, Mumbai is elected as the President of IMS for a period of one year with effect from April 01, 2018.
Members of the Council : Prof. Sanjib Kumar Datta, University of Kalyani, Kalyani; Prof. Asma Ali, AMU, Aligarh; and Prof. G. P. Raja Sekhar, IIT, Kharagpur have been elected as Members of the Council of IMS for a period of three years w. e. f. April 1, 2018.

Item No. 10: Any other item with the permission of the chair.
There was no other item for consideration.
The Meeting ended with a vote of thanks to the President of IMS, the members present and the local organizers of the conference.

N. K. Thakare
General Secretary
Indian Mathematical Society

Memorial Award Lectures

During every Annual Conference of the Society, the following Memorial Award Lectures are arranged as a part of the Academic Programme (each award lecture is of one hour duration with no other parallel session) :

(1) P. L. Bhatnagar Memorial Award Lecture (Instituted in 1987).
(2) Srinivasa Ramanujan Memorial Award Lecture (Instituted in 1990).
(3) V. Ramaswamy Aiyer Memorial Award Lecture (Instituted in 1990).
(4) Hansaraj Gupta Memorial Award Lecture (Instituted in 1990).
(5) Ganesh Prasad Memorial Award Lecture (Instituted in 1993 ; and delivered every alternate year).

Each of these Lectures carry a token honorarium of Rs. 5000/- along with a citation.

Members of the Society are requested to suggest the names of the prospective speakers, along with their brief write-up, for these awards. The suggestions may be sent to Professor N. K. Thakare, the General Secretary of the Indian Mathematical Society up to May 31, 2018. His e-mail address is nkthakare@gmail.com

IMS Sponsored Lectures

To popularize mathematics and to create awareness regarding the Society and its activities in the Country, the Society has a Scheme of **Sponsored Lectures**. It provides a token support of Rs. 1000/- to a number of Departments / Institutions for organizing popular and semi technical lectures.

Prof. Ravi Kulkarni has also donated Rs. 1,25,000/- to organize **Meenakshisundaram–Patoudi lectures**.

Members arranging such lectures are required to send the report of the arranged lectures to The Treasurer, IMS, with a copy to The Editor, `The Mathematics Student`.

Society intends to enhance this activity of organizing such lectures at more and more centers. Members desirous to organize such lectures at their centers may write to the General Secretary Prof. N. K. Thakare through their respective Head of the Department.

Periodicals published by the Society

The Society publishes two periodicals: `The Journal of the Indian Mathematical Society` (JIMS; the Journal; ISSN 0019-5839) and **The Mathematics Student** (Math Student; the Mathematics Student; ISSN 0025-5742), both of which are quarterly. The details can be found on the website: www.indianmathsociety.org.in

Subscriptions

Annual subscription for the Journal / the Mathematics Student :
For each periodical

- Rs. 1500/- for Libraries of Educational Institutions in India - provided the subscription is direct or through an agent who gives complete name and address of the subscriber. The supply will be made directly to the subscribing library. If an agent subscribes for an educational Institution in India, the subscription is Rs. 1800
- Rs. 8000/- for others for personal use or to the agents who do not supply the name and address of the end user.
- $150/- for personal use or for Libraries outside India.

The agents are entitled to 15 % discount on their orders.

From the 2012 issue of The Mathematics Student onwards, the life Members are given online access to `The Mathematics Student` / are sent the soft copy of `The Mathematics Student`, instead of supplying the hard copy, for their personal use (not for circulation) at their E-mail address registered with the Society.

Those Members who have not registered their e-mail address are requested to register it online on msgoesgreen@gmail.com

It may please be noted that the contents of `The Mathematics Student` will continue to be available on the Society's website www.indianmathsociety.org and a physical copy of `The Mathematics Student` will continue to be available at the IMS Library (Ramanujan Institute of Advanced Study in Mathematics, Madras University, Chennai) as well as at the Registered Office of the Society (Department of Mathematics, S. P. Pune University, Pune 411 007) for reference during office hours.

Membership of the Society

Life Membership Fees:
Rs. 2000/- (US $500/- for those residing outside India - referred to as *International Life Members*).

The Life Members of the Indian Mathematical Society who have registered their e-mail with the Society are entitled to a **FREE online access to** `The Mathematics Student` for their personal use (not for circulation). They can subscribe the Journal at Rs. 1500/- (US $ 35/-) for their personal use (not for sale/resale).

Ordinary Annual Membership Fees:
Rs. 250/- (US $50/- for those residing outside India).

Sessional Membership Fees:
Rs. 250/- (US $50/- for those residing outside India). Sessional Members are those who join the Society only for a particular Session. They may contribute papers for

presentation and / or participate in any of the academic programmes held during the Session.

- *Membership form is available on the IMS website.*

Business Correspondence and Payments:

All business correspondence be addressed to Prof. S. K. Nimbhorkar, Treasurer, IMS; Department of Mathematics, Dr. B. A. M. University, Aurangabad 431 004 (Maharashtra), India. All payments should be sent to Prof. S. K. Nimbhorkar, Treasurer, IMS by DD / payable at par cheque drawn in favor of **"The Indian Mathematical Society"** payable at **Aurangabad** (Maharashtra), India at the address mentioned in the above.

Members in good standing:
A member is considered to be of good standing in a particular year if he/she has paid his/her Membership dues by **July 31**st of that year.

IMS Library:
The information pertaining to IMS library is available on the website www.indianmathsociety.org.in of the society.

Guidelines for acceptance of Donations to the Society:

There will not be any further institution of Memorial Award Lectures. (This point was discussed in the earlier meetings of the Council and such was the consensus).

The donation amount will not be less than Rupees Five Lacs. (There could be an upward revision of this amount from time to time).

The donor may be an individual or a trust or a group of individuals.

The Indian Mathematical Society will solely and independently own the amount donated to it.

A prospective donor should approach the General Secretary of the Indian Mathematical Society with a Offer. Keeping with the spirit of this Policy Guidelines and if so felt necessary, referring to the Council whether the proposal be negotiated or not, in his wisdom, the General Secretary will negotiate the terms and conditions for each donation proposal and will put it before the Council for its consideration and approval. The Council will deliberate on the proposal, and after modifications, if any, may accept the proposal through a special resolution with specific details mentioning the terms and conditions. This will be published in the IMS News Letter after the Donor agrees to the resolution of the Council.

Ordinarily during every Annual Conference of the Society there are several Invited Lectures and Symposia running in parallel sessions. One of these academic programmes may be permanently marked / identified as so and so sponsored programme in the (fond) memory of or so and so sponsored programme in the honor of as per the wish of each donor by the Council. This programme may be arranged in a parallel session during the Conference.

The Council through its Academic Planning Committee (APC) will be the final authority in this regard to finalize the name of a speaker of an invited talk or the names of the Symposia speakers for this sponsored programme. The modus operandi for identifying the speaker(s) may be decided by the Council.

The invited speaker(s) will be the guest of the host institution. In case of an honorarium, if any, to the invited speaker, the amount of the honorarium will not exceed the honorarium amount for the existing Memorial Award Lectures.

Ordinarily train travel to the extent of AC-2 Tier be reimbursed. However, in special cases the domestic air travel may be considered.

Not withstanding the above,

(A) An offer of a donation with a stipulated purpose (not as part of the corpus), may be accepted by the Council on its merit.

(B) An offer of a donation of any amount in general, without any stipulated conditions, may be accepted by the Council on its merit as a part of the General Purpose Corpus.

The Council reserves its right whether or not a particular donation be accepted.

Green initiative taken by the Society-
A fervent appeal to all members of the Society

As a part of the "Green Initiative "taken by the Society (for further details, refer Society's website www.indianmathsociety.org.in), the Council of the Society has decided to send online the soft copy of the Mathematics Student / give online access to the Mathematics Student to all the Life members instead of supplying the hard copy. For this purpose, all the members of the Society are requested to register their e-mail address online, along with Name and the **Unique Membership Number** therein, to J. R. Patadia on **imsgoesgreen@gmail.com** or **jamanadaspat@gmail.com** so that further necessary action can be taken.

Important Change:
This newsletter also includes the abstracts of accepted papers for presentation as well as abstracts of invited talks, etc. in the just ended annual conference. From this issue of the newsletter this policy will be followed every year and such abstracts shall not be included in the issues of **The Mathematics Student**.

Abstracts of the papers presented at the 83^{nd} IMS Conference, Sri Venkateswara University, Tirupati, Andhra Pradesh

IMS MEMORIAL AWARD LECTURES

31^{st} P. L. BHATNAGAR MEMORIAL AWARD LECTURE

UNDERSTANDING UNDERSTOOD INSTABILITIES IN FLUIDS by P. G. Siddheshwar Department of Mathematics, Bangalore University, Bangalore 5600056, India, Email: matdrpgs@gmail.com.

Classical Instabilities in Newtonian fluids in the absence or presence nanoparticles or nanotube in them will be discussed with a new perspective. Rayleigh-Taylor, Raleight-Benard, Benard-Marangoni, Tollmein-Sehlichting and Kuppers-Lortz instabilities are some of the important ones that are going to be discussed in the context of real fluids by considering the value of their thermophysical properties. The need of carrying out theoretical fluid dynamics studies with inputs from experiments will be highlighted upon.

28^{th} HANSRAJ GUPTA MEMORIAL AWARD LECTURE

MODULAR-TYPE TRANSFORMATION AND INTEGRAL INVOLVING THE RIEMANN Ξ FUNCTION by Atul Dixit Indian Institute of Technology Gandhinagar-Gandhinagar, India, Email: adixit@iitgn.ac.in

On page of 220 of his Lost Notebook, Srinivasa Ramanujan stated a beautiful modular-type transformation of the form $F(\alpha) = F(\beta), \alpha, \beta = 1$, involving the digamma function, which is also liked to an integral involving the gamma function and the Reimann Ξ function. By a modular type transformation, we mean a relation between two expressions governed by the transformation $z \to \frac{-1}{z}$,which can be recast into the equivalent form $\alpha \to \beta$ for $\alpha\beta = 1$. Such a transformation along with an integral involving the Riemann Ξ function linked to it was successfully employed by G.H. Hardy in his famous proof of the infinitude of the zeros of $\zeta(s)$ on the critical line. The first proof of Ramanujan's transformation was given by Bruce . Berndt and the speaker. Since then, there have been several generalizations and alalogues of this transformation for Hurwitz zeta function, Dirichlet L-Function etc. Many new modular-type transformations of different kinds have also been obtained in the recent years. Very recently, Aashita Kesarwani, Victor H. Moll and the speaker were able to give an example of a generalized modular-type transformation of the form $F(z, w, \alpha) = F(z, iw, \beta), \alpha\beta = 1$ and , in the course of studying it, they were naturally led to an elegant generalization of the modified Bessel function of the second kind which possesses a rich theory. This talk will be a survey on these modular-type transformations and their applications.

13^{th} GANESH PRASAD MEMORIAL AWARD LECTURE

APPROXIMATION BY SPLINE FUNCTIONS AND ITS APPLICATIONS by P.V. Jain Department of Mathematics and Computer Science, R.D. University, Jabalpur 482001, India (Email: pvjrdvv@rediffmail.com)

Every experimental science involves the output as a result of some input. The output may be in the form of some data set or function or some other information in general. In order to analyze the result of the experiment, the output must meet the requirement of the nature of analysis, like if it is in the form of a function, it should be continuous, differentiable, integrable etc. If the output is not as per the requirement, the role of its desired approximation terms in picture. Hence, the approximation plays a key role in all branches of science and technology. In the present talk, the speaker would be covering different methods of approximation

with special emphasis on approximation by Spline functions and Finite Elements. The constructive aspects along with convergence of these tools of approximations would be highlighted.
The conducting part of the talk covers the glimpses of some implicational aspects of these tools to One Dimensional Cutting Stock-Problems (ID-CSP) and Soil Erosion from watershed

28^{th} V. RAMASWAMY AIYER MEMORIAL AWARD LECTURE

CLASSIFICATION OF MANIFOLDS - DIFFERENT SHADES by H. K. Mukherjee NEHU, Shillong, India (Email: himadri@nehu.ac.in)

Classifications of 1 and 2 dimensional manifolds are classical. Classifications of 3, 4 and higher (> 4) dimensional manifolds present techniques of different shades. The purpose of the talk would be to give an overview of these developments.

28^{th} SRINIVASA RAMANUJAN MEMORIAL AWARD LECTURE

THE TIMED PLACTIC MONOID by Amritanshu Prasad IMSc, Chennai (Email: amri@imsc.res.in)

The plactic monoid in the monoid of all words in the alphabet of positive integers modulo relations called Knuth equivalences. It plays an important role in algebraic combinatorics, specifically to understand properties of the Robinson-Schensted-Knuth correspondence, and the Littlewood- Richardson rule.

We extend the notion of Knuth equivalence to timed words. Timed words are words where each letter of the alphabet occurs for a specified amount of time, rather than discretely. This gives rise to a timed version of the plactic monoid. The timed plactic monoid helps under stand an extension of the Robinson-Schensted-Knuth correspondence from integer matrices to real matrices.

IMS AWARD TALKS

MATHAI AWARD LECTURE

DIVERGENCE BASED ROBUST ESTIMATION OF THE TAIL INDEX THROUGH AN EXPONENTIAL REGRESSION MODEL by Abhik Ghosh Interdisciplinary Statistical Research Unit Indian Statistical Institute, Kolkata, India (Email: abhianik@gmail.com)

The extreme value theory is very popular in applied science including finance, economics, hydrology and many other disciplines. In univariate extreme value theory, we model the data by a suitable distribution from the general max-domain of attraction characterized by its tail index-there are three broad classes of tails-the Pareto type, the Weibull type and the Gumbel type. The simplest and most common estimator of the tail index is the Hill estimator that works only for Pareto type tails and has a high bias; it is also highly non-robust in presence of outliers with respect to the assumed model. There have been some recent attempts to produce asympototically unbiased or robust alternative to the Hill estimator; however all the robust alternatives work for any one type of tail. This paper proposes a new general estimator of the tail index that is both robust and has smaller bias under all the three tail types compared to the existing robust estimator. This essentially produces a robust generalization of the estimator proposed by Matthys and Beirlant (Stat Sin 13:853-880,2003) under the same model approximation through a suitable exponential regression framework using the density power divergence. The robustness properties of the estimator are derived in the paper along with an also proposed with application to some real data examples.

A. K. AGARWAL AWARD LECTURE

LUCAS-WIEFERICH PRIMES AND abc CONJECTURE by Sudhanshu Sekhar Rout Institute of Mathematics and Applications, Bhubaneswar (Email: lbs.sudhansu@gmail.com)

Let p be an odd prime. If $a^{p-1} \equiv 0(modp^2)$ for some integer a, then we say that p is a Wieferich prime for base a. In this talk, we shall define Lucas-Wieferich primes which is an analogue of the famous Wieferich primes. We prove that, under the abc conjecture for the quadratic number field, there are infinitely many balancing non- Wieferich primes (which is a particular example of Lucas- Wieferich primes). Moreover, under the assumption of *abc* conjecture for the number field, we obtain a lower bound for number of such primes

A. NARSINGA RAO MEMORIAL PRIZE LECTURE FOR 2015

THE DYNAMICS OF SEMIGROUPS OF TRANSCENDENTAL ENTIRE FUNCTIONS by Dinesh Kumar DDU College, University of Delhi, New Delhi, India (Email: dinukumar680@gmail.com)

We shall discuss the dynamics of an arbitrary semigroup of transcendental entire functions using Fatou-Julia theory. Several results of the dynamics associated with iteration of a transcendental entire function have been extended to transcendental semigroups. We have initiated the study of escaping set of semigroups of transcendental entire functions and will discuss some of its topological properties. Several results of the escaping set associated with the iteration of one transcendental entire function have been extended to transcendental semigroups. Some conditions for connectivity of the Julia set of the transcendental semigroups will be considered. We will also discuss finitely generated transcendental semigroups, abelian transcendental semigroups and limit functions of transcendental semigroups on its invariant Fatou components. Some examples of finitely generated transcendental semigroups will be considered.

A. NARSINGA RAO MEMORIAL PRIZE LECTURE FOR 2016

FATOUS LEMMA ON POWER SERIES RING by Abhishek Bharadwaj Channai Mathematical Institute, Chennai-603103

We will discuss the Fatous lemma on power series ring over Dedekind domains and present an application to integrality questions over number fields.

Abstract of the Plenary Talk

RANGES OF FUNCTORS IN ALGEBRA,
by Friedrich Wehrung, LMNO, CNRS UMR 6139, Universite de Caen, Campus 2,BP 5186, 14032 Caen cedex, France (E-mail: friedrich.wehrung01@unicaen.fr)

The problem of determining the range of a given functor arises in various parts of mathematics. We present a sample of such problems, with focus on various functors such as nonstable K-theory, congruence lattices, spectral spaces of ring-like objects. We also sketch some of the ideas involved in the solutions of those problems.

Abstracts of the Invited Talks

1. SPECTRUM AND FINE SPECTRUM OF BAND TRIANGULAR MATRICES, by P.D.Srivastava, Department of Mathematics, Indian Institute of Technology Kharagpur, Kharagpur -721302, India (Email: pds@maths.iitkgp.ernet.in)

In this article, we consider the problem to find the spectrum and fine spectrum of lower and upper triangular band matrices such that each band is convergent

sequence. These kind of matrix can be expressed as a compact perturbation of banded Toeplitz matrices. In this connection, a result regarding the location of the roots of a polynomial with respect to the unit circle is obtained. Some results on the compactness of the operator are derived. Finally, suitable examples are given in support of our results.

2.FACTORIZATIONS OF SOME TOPOLOGICAL PROPERTIES, by Ananga Kumar Das, Department of Mathematics Shri Mata Vaishno Devi University, Katra-182320, Jammu and Kashmir (E-mail: ak.das@smvdu.ac.in, akdasdu@yahoo.co.in.)

Factorization of topological properties in terms of two weaker variants of the same property is very useful in the study of general topology. None of the topological properties such as compactness, normality, regularity, continuity etc. remain untouched of this process. In this discussion, factorization of some of these properties will be discussed by using a generalization of regularity. Further, it is observed that the variant of regularity utilized for the factorization is not only a generalization of regularity but also a simultaneous generalization of regularity and normality in contrary to the fact that the class of regular topological spaces does not contain the class of normal spaces.

3.NONLINEAR HIGHER DERIVATIONS ON ALGEBRAS WITH APPLICATIONS, by Mohammad Ashraf, Department of Mathematics, Aligarh Muslim University Aligarh-202002 (India).

Let $\mathcal{R}$ be a commutative ring with unity 1. Suppose that $\mathcal{A}, \mathcal{B}$ are unital $\mathcal{R}$-Algebras and $\mathcal{M}$ is nonzero $(\mathcal{A}, \mathcal{B})$-bimodule. Consider the set $\mathfrak{A} = Tri(\mathcal{A}, \mathcal{M}, \mathcal{B}) = \{\begin{bmatrix} a & m \\ 0 & b \end{bmatrix} : a \in \mathcal{A}, m \in \mathcal{M}, b \in \mathcal{B}\}$. It is straightforward to very that $\mathfrak{A}$ is an algebra under matrix operations over $\mathcal{R}$, know as triangular algebras. Let $\mathbb{N}$ be the set of all non negative integers and let $\mathfrak{F} = \{d_n\}_{n\in N}$ be a sequence of mappings (not necessarily linear) of the triangular algebra $\mathfrak{A}$ such that $d_0 = id_{\mathfrak{A}}$. Then $\mathfrak{F}$ is called a non linear higher derivation on $\mathfrak{A}$ if for each $n\epsilon\mathbb{N}$,$d_n(T_1T_2) = \sum_{i+j=n} d_i(T_1)d_j(T_2)$, holds for all $T_1T_2\epsilon\mathfrak{A}$ In addition if $\mathfrak{F} = \{d_n\}_{n\in N}$ is a sequence of $\mathcal{R}$-linear mappings in the above definition, then $\mathfrak{F}$ is said to be a higher derivation of $\mathfrak{A}$. Motivated by the extension of generalized derivations in the existing literature one can introduced the notations of nonlinear generalized higher derivation on $\mathfrak{A}$. Let $\Delta = \{\delta_n\}_{n\in N}$ be a sequence mappings (not necessarily linear) of a triangular algebra $\mathfrak{A}$ such that $\delta_0 = id_{\mathfrak{A}}$. Then Δ is a nonlinear generalized higher derivation on $\mathfrak{A}$ if there exist a nonlinear higher derivation $\mathfrak{F} = \{d_n\}_{n\in N}$ of $\mathfrak{A}$ such that $d_n(T_1T_2) = \sum_{i+j=n} d_i(T_1)d_j(T_2)$ holds for all $T_1T_2 \in \mathfrak{A}$ and for each $n \in \mathbb{N}$ In addition if $\Delta = \{\delta_n\}_{n\in N}$ is assumed to be a sequence of $\mathcal{R}$-linear mapping underlining sequence of mapping $\mathfrak{F} = \{d_n\}_{n\in N}$ is a higher derivation of $\mathfrak{A}$ in the above definition, then Δ is said to be a generalized higher derivation of $\mathfrak{A}$. During the last few decades, many authors investigated the additivity of multiplicative maps are several classes of rings and algebras. In the year 1969, Martindale initiated the study of additivity of multiplicative objective maps from a prime ring containing a non trivial idempotent arbitrary ring. Yu and Zhang [Linear Algebra Appl.,432(2010)] proved that every nonlinear Lie derivation of triangular algebras is the sum of an additive derivation and a map from triangular algebra into its center sending commutators to zero. Ji, Liu and Zhao[Linear Multilinear Algebra, 60(10)(2012)] proved the similar result for nonlinear Lie tripled derivation of triangular algebras. In the present talk, we give an up-to-date account of the work done by various authors in the setting of nonlinear higher derivation (or nonlinear

generalized higher derivation) on various algebras.

4.THE IMPACT OF THE 21st CENTURY MODERN TECHNOLOGIES IN CONVENTIONAL, BLENDED AND WEB BASED TEACHING AND LEARNING COLLEGE MATHEMATICS,by Om Ahuja Professor of Mathematical Science, Kent State University, Ohio-USA (Email: oahuj@kent.edu.)

This talk address on how many colleges and universities in North America and, in particular, Kent State University is in the process of integrating modern technologies into its conventional, blended and full web-based teaching and learning. In particular, this talk focus on the use of internet technologies in teaching, learning and evaluation in face-to-face, blended and fully web-based college mathematics courses.

5.NON-STATIONARY EXTENSIONS OF BANACH FIXED POINT THEOREM, WITH APPLICATIONS TO FRACTALS, by David Levin, Tel-Aviv University, Israel.

Iterated Function Systems (IFS) have been at the heart of fractal geometry almost from its origin, and several generalization for the notion of IFS have been suggested. Subdivision schemes are widely used in computer graphics and attempts have been made to link limits generated by subdivision schemes to fractals generated by IFS. With an eye towards establishing connection between non-stationary subdivision schemes and fractals, this talk introduce the notion of trajectories of maps defined by function systems which may be considered as a new generalization of the traditional IFS. The significance and convergence properties of forward and backward trajectories is presented. Unlike the ordinary fractals which are self-similar at different scales, the attractors of these trajectories may have different structure at different scales.

6.EXTENDED WRIGHT TYPE HYPERGEOMETRIC FUNCTIONS : SOME RECENT DEVELOPMENTS by R.K.Jana Department of Applied Mathematics and Humanities, Sardar Vallabhbhai National Institute of Technology (SVNIT) Surat, Gujarat, India.

Several interesting families of hypergeometric function were investigated systematically by different researchers in recent past. In the present talk , a new family of hypergeometric function will be introduced. Several properties and application of this extended Wright type hypergeometric function will be discussed.

7.SUMMABILITY METHODS IN APPROXIMATION PROCESS by M. Mursaleen Department of Mathematics, Aligarh Muslim University, Aligarh (Email: mursaleenm@gmail.com.)

Korovkin type approximation theorems are useful tools to check whether a given sequence $(L_n)_{n\geq 1}$ of positive linear operators on $C[0,1]$ of all continuous functions on the real interval $[0,1]$ is an approximation process. That is, these theorems exhibit a variety of test functions which assure that the approximation property holds on the whole space if it holds for them. Such a property was discovered by Korovkin in 1953 for the functions$1, x$ and x^2 in the space $C[0,1]$ as well as for the functions 1, cos and sin in the space of all continuous 2π-periodic functions on real line. In this talk, we use the notion of almost convergence, statistical convergence and other summability methods to prove the Korovkin type approximation theorems.

8.DECOMPOSITION OF HYPERCUBES by Y.M. Borse Department of Mathematics, S.P. Pune University, Pune, India.

The n-dimensional hypercube is the graph whose vertex set is the set of all binary

n-tuples, where two n-tuples are adjacent if and only if they differ in exactly one coordinate. Hypercubes are perhaps the most well known of all interconnection networks for parallel computing, given their basic simplicity, their generally desirable network topological and algorithmic properties, and the extensive investigation they have undergone. Graph decompositions is an interesting and classical area of research within graph theory and has lot of application to different topics such as interconnection net-works, routing of networks , design and analysis of networks and algorithmic aspects. Motivated by application in parallel processing, the problem of decomposing the hypercube into edge-disjoint copies of smaller graphs have been considered by several authors.
In this talk, we discuss the decompositions of hypercubes into trees, into Hamiltonian cycles and into smaller cycles, into paths and into regular subgraphs. There are some open problem and conjecture on decompositions of hypercubes into cycles, into paths and into regular subgraphs. We have given partial solutions to some these problems and also have extended the results to the more general class of the Cartesian product of cycles.

9.EUCLIDEAN ALGORITHM IN NUMBER FIELDS by K. Srinivas Department of Mathematics, IMSc, Chennai, Chennai, India.

Let K be a number field and $\mathcal{O}_K$ be its ring of integers. We say the number field K is Euclidean if there exists a function $\phi : \mathcal{O}_K \to N \bigcup \{0\}$ such that $\phi(\alpha) = 0$ if and only if $\alpha = 0$, and for all $\alpha, \beta (\neq 0)$ in $\mathcal{O}_K$ there exists a $Y \epsilon \mathcal{O}_K$ such that $\phi(\alpha - \beta\gamma) < \phi(\beta)$. One of the important problem in number theory is the study of classification of number fields which are Euclidean. We shall discuss some recent results when K is real quadratic field and cubic field. This is a joint work with M. Rama Murthy and M. Subramani.

Abstracts of the lectures delivered in symposia

Symposium-I
GROUP THEORY

1.THE STRUCTURE OF RATIONAL GROUP ALGEBRAS: FROM CLASSICAL TO MODERN APPROACH, by G. K. Bakshi Panjab University, Chandigarh (Email : gkbakshi@pu.ac.in)

The problem to finding the primitive central idempotents and the Wedderburn decomposition of the rational group algebra $\mathbb{Q}(G)$ of a finite group G lies in the heart of group ring theorists. The Wedderburn components of $\mathbb{Q}(G)$ are in 1-1 correspondence with the primitive central idempotent of $\mathbb{Q}(G)$. In general there is a surjective map (not necessary injective) associating each complex irreducible character χ of G with one of the primitive central idempotents of $\mathbb{Q}(G)$, denoted $e_{\mathbb{Q}}(\chi)$. In this case $\mathbb{Q}Ge_{\mathbb{Q}}(\chi)$ is the simple component of $\mathbb{Q}(G)$ associated with $e_{\mathbb{Q}}(\chi)$.The classical approach of writing $e_{\mathbb{Q}}(\chi)$ is bye Galois descent, which has its limitations in computations. Not only that it is difficult to compute $e_{\mathbb{Q}}(\chi)$ via Galois decent, the approach does not provide any information of the Wedderburn component $\mathbb{Q}Ge_{\mathbb{Q}}(\chi)$. To overcome this difficulty, a recent approach (which uses the subgroup structure of G) was initiated in 2004. In this talk, we provide up to date information on the recent approach to calculate the primitive central idempotents and the Wedderburn decomposition of $\mathbb{Q}(G)$.

2.TWISTED CONJUGACY IN HOUGHTON GROUP by P. Sankaran IMSc, Chennai (Email: sankaran@imsc.res.in)

Let ϕ be an automorphasm of an infinite group G. One has an action of G on

itself obtained as $g.x = gx\phi(g^{(-1)})$. The orbit of this action are called the twisted conjugacy classes of G. It is an interesting problem to determine, for a given group G, whether there are infinitely many twisted conjugacy classes for *every* automorphism of G. We shall address this problem for the family of Houghton groups. $H_n, n \geq 2$. (These groups will be defined in the talk.) This is based on joint work with Daciberg L. Gonçalves.

3.GENERATING MATRIX GROUPS OVER NUMBER RINGS AND POLYNOMIAL RINGS BY UNIPOTENTS by B. Sury, ISI, Bagalore (Email :surybang@gmail.com)

Generating matrix groups by unipotent matrices is classical problem over fileds. Over rings, the problem has different aspects depending on the ring. Over number rings, the key is class field theory. Over polynomial rings over finite fields, the analogue of the Dirichlet theorem on primes in progressions proves usefull. Over rings of stable rank 1, one can use the theory of linear algebraic groups to reduce the general case to SL(2).

4.SYMPLECTIC POLARITIES AND OVOIDS IN $PG(3, 2^t)$ by NSN Sastry Indian Institute of Technology Dharwad, Dharwad (Email : nnsastry@gmail.com)

A polarity of a point-line incidence geometry $\Gamma = (\mathcal{P}, \mathcal{L})$ is an incidence preserving bijection of order two between the point set $\mathcal{P}$ of Γ and the line set $\mathcal{L}$ of Γ. The substructure Γ' of Γ defined by the set of (absolute) elements of $\mathcal{P} \bigcup \mathcal{L}$, each incident with its image, is a geometry of substantial interest: it often posses enough structure to allow the reconstruction of Γ, and is the "natural geometry" on which the centraliser in the symmetry group of Γ of the polarity acts. A generic example is the polarity of a finite dimensional projective space define by a nondegenerate symmetric, alternative or hermitian form; the substructure is the corresponding sympectic, quadratic or a unitary space; and the centralising group is the corresponding classical linear group. The point-line geometries for the groups of Lie type whose Dynkin diagram (sans the direction of edges) admits an automorphism of order 2 also admit polarities; the corresponding groups are maximal in the symmetry group of the parent geometry and admit a (B, N)- structure. In this lecture, I discuss symplectic polarities of the projective space $\Gamma = PG(3, 2^n)$ and the Tits polarities of the substructure Γ' (the geometry of $C_2(2^{(2n+1)})$ define by the absolute elements of a symplectic polarity. The set of absolute points (called an ovoid, a combinatorial anologues of a sphere in 3-space) is, equivalently, a maximal set of mutually noncollinear points in Γ'. We discuss several aspects of the collection of ovoids: their classification and packing of 3-space by ovoids, relation to polynomial equations, invasive planes, (q, q^2)- generalized quadrangles, etc.

5.SCHUR MULTIPLIER OF CENTRAL PRODUCT OF GROUPS by Manoj Yadav HRI Allahabad (Email: myadav@hri.res.in)

Let G be a central product of two groups H and K. Lower bound on the order the Schur multiplier of G was given by J. Wiegold in 1971, in case G is finite. Such a bound for arbitrary groups was provided by B. Eckman, P.J. Hilton and U. Stammbach in 1973. In this talk, I'll discuss about lower and upper bounds on the order the second cohomology group of G, having coefficients in an abelian divisible group D with trivial action, in terms of the second cohomology group of certain quotients of H and K. In particular, I'll present a refinement of the existing bounds on the Schur multiplier of G in terms of the Schur multipliers of dertain quotients of H and K. This is based on joint work with L.R. Vermani and Sumana Hatui.

6.IRREDUCIBLE REPRESENTATIONS OF SL_2 **OVER PRINCIPAL**

IDEAL LOCAL RINGS OF EVEN CHARACTERISTIC by Hassain M Ph.D. Student, IISc, Bangalore (Email: hassainm@iisc.ac.in)

Let $\mathcal{O}$ be complete discrete valuation ring such that residue field has order q. In this talk we will focus on the construction of continuous irreducible representations of General Linear group $GL_2(O)$ and its subgroup Special Linear group $SL_2(\mathcal{O})$. It is well known that any such representation of $GL_2(\mathcal{O})$ and $SL_2(\mathcal{O})$ factor through a finite quotient of $GL_2(\mathcal{O})$ and $SL_2(\mathcal{O})$ respectively. The construction of all continuous irreducible representations of $GL_2(\mathcal{O})$ has already appeared in the work of Stasinski, Onn and Krakovski-Onn-Singla. It was observed that for two complete discrete valuation rings $\mathcal{O}$ and $\mathcal{O}'$ the group algebra of finite quotients of $GL_2(\mathcal{O})$ and $GL_2(\mathcal{O}')$ are isomorphic whenever cardinality of the residue fields of $\mathcal{O}$ and $\mathcal{O}'$ is equal. It is natural to ask whether it is true for $SL_2(\mathcal{O})$ as well.
In the case of $SL_2(\mathcal{O})$ and q odd, a construction of irreducible representations appear in the work Z Jaikin and Krakovski-Onn-Singla. However for even q, the construction of irreducible representations of $SL_2(\mathcal{O})$ is not yet known in genral. For $\mathcal{O} = Z_2$, a construction of these representations appears in the work of Nobs. In this talk we describe Nobs results and show why these do not work for general $\mathcal{O}$ with residue field of even order. Next, we show a construction of certain class of irreducible representations of $SL_2(F_2[[t]])$. By using this we are able to show that the group algebras of $SL_2(Z/2^mZ)$ and $SL_2(F_2[t]/t^m)$ are not isomorphic for all even $m > 2$. This is based on ongoing joint work with Pooja Singla.

Symposium-II
MATHEMATICAL BIOLOGY

1.FOURIER SERIES IN MODELLING PULSE PROPAGATION IN ARTERIES by Girija Jayaraman (Retd.) Department of Mathematics, Indian instutite of Technology, Delhi, New Delhi, India (Email: girija.jayaraman@gmail.com)

Fourier Series was invented by Fourier $(1768-1830)$ with an objective to steady the heat equation through the solution in terms of a series of sine and cosine functions. This remarkable discovery created an awareness and recognition that Fourier Series can be effectively used to analyze many challenging problems in many traditional fields as well as interdisciplinary areas where there is requirement for modelling a periodic/oscillatory behaviour. This talk will give a brief historical review of previous pulse wave propagation studies related to arterial flow. The focus will be on the role of Fourier series in replicating the observed pulsatile profiles of pressure/flow/velocity-basic for modelling the pulse wave phenomena in the arteries. Experimental data got from in vivo/in vitro studies will be cited for the validation of the models. The potential of mathematical models based on higher Mathematics and high speed Computational work in extending our knowledge through future studies will be highlighted.

2.MATHEMATICAL MODELLING OF ZIKA VIRUS DISEASE by Mini Ghosh Division of Mathematics, School of Advanced Science, VIT University Chennai Cmpus, Chennai, India (Email: minighosh@vit.ac.in)

The Zika virus (ZIKV) is a member of the virus family Flaviviridae and its dynamics is governed by the day time activities of Aedes mosquitoes (i.e. A aegypti and A. Albopictus, etc.). The human to human transmission of Zika virus is through the bites of infected female mosquitoes of Aedes species. However, there exist new evidences of its transmission dynamics being governed via sexual contact and that has been reported from different nations (i.e. Argentina, Canada, Chile, France, Italy, New Zealand, Pure, Portugal and USA).The proposed talk briefly introduces

mathematical modelling of vector-borne diseases with special emphasis on Zika virus disease and presents the important issues in modelling and analysis, and repots some of our research results in the area of mathematical modelling of Zika virus disease

3.AN INTEGRATED APPROACH FOR MODELING CARBON MONOXIDE TRANSPORT by Maithili Sharan Centre for Atmospheric Sciences, Indian Institute of Technology Delhi Hauz Khas New Delhi 110016 (Email : mathilis@cas.iitd.ac.in)

Due to Increase in vehicular traffic and urbanization, Carbon monoxide (CO) is released in to the atmosphere which affects directly human health. CO released in the atmosphere is inhaled in the lungs through the process of respiration. The affinity of hemoglobin with CO is about two hundred times more than that with oxygen. CO displaces oxygen from oxyhemoglobin in the blood to form carboxyhemoglobin ($COHb$) impairing supply of oxygen to the body. The concentration of $COHb$ in the blood is considered as an index of the impact of CO on human beings. The eight hour exposure to 9 ppm CO leads to a $COHb$ level exceeding 2 whereas one hour exposure to 33 ppm gives rise to $COHb < 1$. Effectively CO released from various sources is dispersed in the atmosphere and a mathematical model is necessary for computing the concentration CO inhaled by human beings. A mathematical model is also required for computing $COHb$ in the circulatory system as a function of exposure time and the concentration of CO in the atmosphere. Thus, an integrated modeling approach involves the formulation of models (i) for the transport CO in the atmosphere and (ii) $COHb$ to predict the impact of CO on human beings. A mathematical model for the dispersion taking into account the diffusion and advection will be described. The model is validated with the SF6 as diffusion-data are primarily available with this tracer. A mathematical model is developed for the computation of $COHb$ in the blood by considering the molecular diffusion, advection and the chemical reaction for forming $COHb$ from displacement of oxygen from O_2Hb by CO. The model requires the knowledge of the concentration of CO in the lungs. For this, a simple compartmental model is formulated describing a relationship between the concentrations of CO in the lungs and atmosphere. The model is evaluated with $COHb$ measurements in the blood both for uptake and removal of CO by the body. Finally, the limitations with the integrated approach will be discussed

4.PHYSIOLOGICAL FLUID DYNAMICS: FLOW THROUGH RENAL TUBULES by G. Radhakrishnamacharya National Institute of Technology, Warangal, India (Email : grk@nitw.ac.in)

The fundamental principles of physiological fluid dynamics and, in particular, cardiovascular system are explained.
The hydrodynamical problem of flow in proximal renal tubule is studied by considering axisymmetric flow of a viscous, incompressible fluid through a long narrow tube of varying cross-section with reabsorption at the wall. Assuming that the bulk flow decays exponentially with axial distance, analytical expressions for flow variables have been obtained by perturbation method in terms of wall parameter. The effects of wall parameter on pressure drop, radial velocity and wall shear stress have studied and the results are found to be in good agreement with the existing results for renal tubules.

5.DEGREE OF PREY REFUGES : CONTROL THE COMPETITION

AMONG PREY AND FORAGING ABILITY OF PREDATOR by Debaldev Jana, Department of Mathematics, SRM Research Institute, SRM University, Tamil Nadu, India (Email id : debaldevjana.jana@gmail.com, debaldevjana.k@ktr.srmuniv.ac.in)

Every population should exploit a specially variable diverse environment so as to increase their Darwinian fitness. Dynamics of any local population depends upon attributes of the local habitat. Although, use of refuge habitat by prey population can reduce their risk predation, refuge use may also involve cost such as increased interspecific and intraspecific competition within the refuge patch. Surveys in the Sunderban mangrove ecosystem show that two detritivorous prey fishes Liza Parsia and Liza tade coexist in nature by using refuges with the presence of the predator fish population Lates calcarifer. In view of such observations in mind, a three component model conceiving of two competing prey and one predator is considered in the present study with the inclusion of Holling type-II response function incorporating a fraction of prey refuge. The geographic position of these refuge patches tend to determine the population of prey residing in these patches which ultimately leads to the interspecific competition inclusion between prey. Here, we have differentiated the geographic position of the refuge patch into five different cases, for example, disjoint refuge patch (no competition between refuge population), partially overlapping refuge patch(competition between non-refuge and partially refuge prey population), only one prey refuge patch (competition between one prey population entirely and non-refuge prey population of the other) and common refuge patch(competition between both refuge and non-refuge prey in and out of the common patch). Equilibrium abundance of each population and the stability criterion are absolutely motivated by the interspecific competition strategies by both prey due to their patch selection. Mathematical results and numerical results support these hypotheses.

(vi)MATHEMATICAL IMMUNOLOGY by P Kandaswaamy Chinna Puthur-641663

A simple Mathematical model for the human immune system will be discussed in this lecture. Four basic important variables considered are number of antigens $V(t)$, number of antibodies $F(t)$, plasma cell concentration $C(t)$ and the capacity of the vital organ $m(t)$. Four first order nonlinear coupled ordinary differential equations will be constructed to represent the human immune system. A qualitative study of theses system of equations and their possible use in real life situations will be discussed.

SYMPOSIUM-III
INTERACTION OF ALGEBRA AND DISCRETE MATHEMATICS

1.MEDIAN PROBLEM ON MEDIAN GRAPHS by Manoj Changat Department of Futures Studies, University of Kerala, Trivandrum-695581 (Email : mchangat@gmail.com)

Median graphs from one of the central graphs in metric graph theory. A connected graph G is a median graph if for every triple of vertices,(u, v, w) there is a unique vertex called the median of the triple (u, v, w), which is the vertex belonging to the shortest paths between each pairs of vertices of u, v, w. Median graphs are isometric subgraphs of hypercubes in which the median of every triple (u, v, w) is the subgraph and the hypercube are the same. Median vertex of a profile π(sequence) of vertices $\pi = (v_1, v_2, \ldots, v_k)$in a connected graph G is a vertex v such that, the

remoteness: $D(v,\pi) = \sum_{i=1}^{k}[d(v,x_i)]$ is minimum. The set of all median vertices of π is defined as the median set π denoted as $Med(\pi)$. Several algorithms and strategies are available for median computation in median graphs, [2].
A Concensus Function is a function in which the input is profile π of vertices of a graph, and the range is a subset of vertices of the graph. The median function Med on G is a consensus function defined as $Med(\pi)$=$\{v : v$ is median of $\pi\}$. That is, the median function is a consensus function on the of all profiles of vertices in the graph G which returns the $Med(\pi)$. One of the central problems on consensus function is the axiomatic characterization of the median function using a set of consistent and independent axioms on an arbitrary consensus function [1].
In this paper, we describe the strategies algorithms for computing $Med(\pi)$ for arbitrary profiles and a recently obtained axiomatic characterization of the median function on median graphs.
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2.IRREDUCIBLE NO-HOLE COLORING OF HYPERCUBES by Pratima Panigrahi Department of Mathematics, Indian Institute of Technology, Kharagpur, India (Email : pratima@maths.iitkgp.ernet.in)

An $L(2,1)$-coloring (labelling) of a graph G is a mapping $f : V(G) \to Z^+ \bigcup\{0\}$ such that $|f(u) - f(v)| \geq 2$ for all edges uv of G and if $|f(u) - f(v)| \geq 1$ if $d(uv) = 2$. The span of an $L(2,1)$coloring f of a graph G denote by span, is equal to max $\{f(v) : v \in V(G)\}$. The span of a graph G, denote by $\lambda(G)$, is equal to min $\{span(f) : f$ is an $L(2,1)$-colloring of $G\}$. For a graph G and an $L(2,1)$-coloring f of it with space k, an integer l is called a hole in f if $l\epsilon(0,k)$ and there is no vertex v in G such that $f(v) = l$. An $L(2,1)$-coloring f of a graph G with no hole in it is called a no-hole coloring of G . An $L(2,1)$-coloring f of a graph G is reducible if there exists another $L(2,1)$-coloring g of G such that $g(u) \leq f(u)$ for all vertices $u\epsilon V(G)$ and the strict inequality holds for at least one. Otherwise f is said to be irreducible. An irreducible no-hole coloring is referred as an inh-coloring. A graph is called inh-colorable if there exists an inh-coloring on it. For an inh-colorable graph G, the lower inh-span or simple inh-span of G, denoted by $\lambda_{inh}(G)$, is defined as $\lambda_{inh}(G)$=min$\{span(f)$: f is an inh-coloring of $G\}$. For an inh-colourable graph G, the upper inh-span or simple inh-span of G, denoted by $\Lambda_{inh}(G)$ is defined as $\Lambda_{inh}(G)$=max$\{span(f)$: f is an inh-coloring of $G\}$. We recall that an n-dimensional hypercube Q_n is the simple graph whose n vertices are the tuples with entries in $\{0,1\}$ and edges are the pairs of these n-tuples that differ in exactly one position. In 2008, Villalpando and Laskar have given inh-coloring of Q_n for $n = 3,4,5,6,7,9,10,11$ only. Here we prove that Q_n, for every, is inh-colorable and hence we get an upper bound for $\lambda_{inh}(Q_n)$. Then we improve the upper bound of $\lambda_{inh}(Q_n)$ for $2^{k-1} \leq N \leq 2^k - k - 1$. Where $k$is a positive integer. Finally, we give an upper bound to the inh-span of an arbitray inh-colorable graphs, and applying this we get an upper bound of $\Lambda_{inh}(Q_n)$ for integer $n \geq 2$.

3.PARTIAL CUBES-DISTANCE PRESERVING SUBGRAPHS OF HYPERCUBES by Matjaz Kovse School of Basic Science, Indian Institute of technology Bhubaneswar, India (Email : kovse@iitbbs.ac.in)

Distance preserving subgraphs of hypercubes are called partial cubes. They appear in different areas from graph theory, enumerative combinatorics, computational geometry, topology, algebra and have found diverse applications in computer science, mathematical chemistry, phylogenetics (Buneman graphs, split networks), axiomatic consensus theory in group choice, network facility location, social sciencemedia theory (knowledge spaces), etc. Few classical and recent results together with some open problems will be presented

4.DOMINATOR SEQUENCES IN HYPERCUBES AND THE FORCING SET CONJECTURE by Lavanya Sivakumar Department of Mathematical Science, Indian Institute of Techanology (BHU), Varanasi, Uttar Prasedh, India (Email : lavanyas.mat@iitbhu.ac.in)

Let $G = (V, E)$ be a connected bipartite graph with bipartition $[X, Y]$and let $|X| \leq |Y|$. A dominator sequence in G is a sequence of vertices $(x_1, x_2, \ldots, x_k)\epsilon X$such that for each i with $2 \leq i \leq k$, the vertex x_i dominates at least one vertex in Y which is not dominated by $x_1, x_2, \ldots, x_{i-1}$. The maximum length of a dominator sequence in G is called the dominator sequence number of G and is denoted by $l(G)$. Let G be a graph that admits a perfect matching. The forcing number of a perfect matching M of G is defined as the smallest number of edges in a subset $S \subseteq M$, such that S is in no other perfect matching. The forcing number of M is defined by $\phi(M)$. A subset S with the property above is said to force M.The decision problem corresponding to the dominator sequence number is known to be NP-Complete. In this talk, we will discuss the maximum dominators sequences of an n-dimensional hypercube Q_n, where n is even. Further, we will also analyze the relation between dominator sequence and forcing sets with respect to hypercubes in particular, and bipartite graphs that admit a perfect matching in general.

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5.DECOMPOSITIONS OF HYPERCUBE BY CYCLES AND PARTIAL CUBES by B. N. Waphare Department of Mathematics, S.P.Pune University, Pune-411007, India (Email : waphare@yahoo.com)

It is known that the $n-$dimensional hypercube Q_n, for n even, has decomposition into k-cycles for $k = n, 2^l$ with $2 \leq l \leq n$. We observe that Q_n has a decomposition into $2^m n-$cycles for $n \geq 2^m$. As an immediate consequence of this result, we obtain path decompositions of Q_n as well. This gives a partial solution to a conjecture posed by Ramras and also, it solves some special cases of a conjecture due to Erde. Partial cube is nothing but the distance preserving subgraph of hypercube. We construct a particular class of partial cubes, vis., good sets, which are distance preserving subgraphs of Q_n. Having maximum number of edges on the given number of vertices. We obtain that Q_n can be partitioned into two good sets, one on n_2 vertices, where $n = n_1 + n_2$. Also we discuss some results related to partition of a good set into small once.

Symposium-IV
FUNCTION SPACES AND INEQUALITIES

1.A NOTE ON MIXED PARANORM SPACES by Eberhard Malkowsky Dr.Zavni Univerzitet u Novom Pazaru, Vuka Karadzica bb, 36300, Novi Pazar, Serbia (Email : Eberhard.Malkowsky@math.uni-giessen.de, ema@pmf.ni.ac.rs)

We generalize the concept of mixed norm spaces [Hedlund 1968/69, Jagers 1974, Kellog 1971] and define a class of mixed paranorm spaces, study their fundamental topological properties and determine their first and second duals [Malkowsky et al, 2017] Furthermore we characterize the classes of matrix transformations from our new spaces into the classical spaces of bounded, convergent and null sequence and of absolutely convergent series [Malkowsky et al, 2017]. We also use the Hausdorff measure of non compactness to characterize some classes of compact operators on our spaces in certain special cases. Finally, we visualize some neighborhoods in our new spaces.

2.SELECTION THEOREM INVOLVING LIPSCHITZ FUNCTION IN BANACH SPACES, by M. A. Sofi, Department of Mathematics, Kashmir University, Srinagar, India (Email: aminsofi@rediffmail.com)

Given a multi-values mapping T between two structures A and B, it is always of interest to explore conditions that would guarantee for each X in A an appropriate choice of the values of T that it takes in $T(X)$, so that the resulting well defined mapping enjoys certain regularity properties. One of the early and well known result belonging to this circle of ideas is the so called Michael's selection theorem which guarantees the existence of a continuous selection of a lower semicontinuous set-values map acting on a metric space and taking values which are nonempty, closed and convex subsets of a Banach space. An old result of Mcshane asserts that Lipschitz maps defined on a subset of a metric space may be extended-not necessarily uniquely-to a Lipschitz map on the whole space. The question naturally arises if the extended map may be chosen in a manner that the resulting map acting between suitable spaces of Lipschitz functions is linear and continuous. The present talk is developed to this question in the setting of Banach spaces. The interplay between the existence of such selection maps and the geometry of the underlying Banach space will be the mail focus of the discussion.

3.FRAMES AND BASES OF SYSTEM OF TRANSLATES ON THE HEISENBERG GROUP, by R. Radha Department of Mathematics, Indian Institute of Techanology, Madras, Chennai (Email: radharam@iitm.ac.in)

A well known result on translates of a function in $L^2(\mathbb{R})$ states that the collection $\{T_k f : k\epsilon\mathbb{Z}\}$ forms an orthonormal system in $L^2(\mathbb{R})$ iff $\sum_{k\epsilon\mathbb{Z}} = |\check{\phi}(\xi + k)|^2 = 1$a.e. $\xi\epsilon\mathbb{T}$. Similarly there are interesting characterizations for the system of translates to be a Bessel sequence, frame, Riesz basis for its closed linear span in terms of Fourier transform. We wish to discuss similar types of problems for system of left translates on the Heisenberg group after looking into the system of twisted translates on $\mathbb{C}^n$ in connection with the Weyl transform. We also discuss frames and a decomposition theorem using Parseval frame generators for a shift invariant space on the Heisenberg group. Finally we state the necessary and sufficient conditions for the orthonormality of wavelet system arising out of left translation and non-isotropic dilation on the Heisenberg group

4.ALMOST SUMMABILITY AND APPLICATIONS, by M.Mursaleen Department of Mathematics, Aligarh Muslim University, Aligarh-202002, India (Email : mursaleenm@gmail.com)

The theory of summability arises from the process of summation of series which now

a days treated as dated field in mathematics but the methods of almost summability and statistical summability have become an active area of research in recent years. The significance of the concept of summability has been strikingly demonstrated in various contexts, e.g. in Fourier Analysis, Analytic Continuation, Quantum Mechanics, Fixed Point Theory, Probability Theory and Approximation Theory[M.Mursaleen, Applied Summability Methods, Springer Briefs, Heidelberg New York Dordrecht London, 2004]. In this talk we discuss almost summability which is further applied to study the summability of Taylor series, Fourier series and Walsh-Forier series

5.EXTRAPOLATION THEORY OF RUBIO DE FRANCIA, by Arun Pal Singh Department of Mathematics, Dyal Singh College (University of Delhi), Lodhi Road, New Delhi-110003 (Email :arunpsl12@yahoo.co.in)

In this talk we would discuss the theory of $A_{\bar{P}}$-weights introduced by Muckenhoupt [1] in 1972. Connected with the $A_{\bar{p}}$-weights, we shall talk about Jones factorization theorem [2] and the extrapolation theory of Rubio de Francia [3] in the context of weighted Lebesgue spaces. A parallel and applicable theory of Rubio de Francia type extrapolation for about some new extrapolation results for $A_{\bar{p}}$-weights in the frame work of grand Lebesgue spaces.

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6.SAWYER‘S DUALITY PRINCIPLE AND APPLICATION TO HARDY-TYPE INQUALITIES, by Pankaj Jain Department of Mathematics, South Asian University, Akbar Bhawan, Chanakya Puri, New Delhi-110021, India (Email : pankaj.jain@sau.ac.in, pankajkrjain@hotmail.com)

Starting from the standard duality in the weighted Lebesgue space L^p_w, we shall discuss the sawyer‘s duality which concerns the subset of L^p_w consisting of non-increasing function. Some recent results regarding Sawyer‘s duality in the frame-work of grand Lebesgue space L^p will be discussed. As an application, we shall talk about Hardy inequalities on the cone of monotone function.

7.FRAMES, BIORTHOGONAL DUAL AND OTHER PROPERTIES ASSOCIATED WITH WAVELET SYSTEM ON R, by Arati Shashi Department of Mathematics,Indian Institute of Technology Madras, Chennai
Email : aratishashi@gmail.com
It is well-known that the characterization of the system of integer translations on R as Bessel sequences, frames and Riesz bases have been obtained in terms of the Fourier transform. The aim of this presentation is to discuss similar types of characterization for the wavelet system emerging out of integer translations and dyadic dilations on R. This is a joint work with R. Radha, Department of Mathematics, Indian Institute of Technology Madras, Chennai

8.SAMPLING AND RECONSTRUCTION IN A SHIFT INVARIANT SPACE WITH MULTIPLE GENERATORS by R. Radha, K.Sarvesh and S.Sampath Department of Mathematics, IIT Madras Department of Mathematics,

IIT Delhi (Email : radharam@iitm.ac.in,sarvesh.kmc4@gmail.com, siva@maths.iitd.ac.in)

The aim of this presentation is to study sampling and reconstruction in a shift invariant space with multiple generators. In the case of one generator it is well known that is a stable set of sampling. But here we will see that can not be a stable set of sampling for $V(\phi)$where $\phi = \{\phi^1, \phi^2, \ldots, \phi^r\}$ where $r \geq 2$. Further we will discuss the perturbation of a stable set of sampling and local reconstruction method along with an illustration and implementation.

9.GENERALIZED CONVOLUTION INEQUALITIES AND APPLICATION, by Sandhya Jain Department of Mathematics, Vivekananda College (University of Delhi) Vivek Vihar, Delhi 110095

In this paper, we characterize $L^p - L^q$ inequality involving a generalized convolution. The convolution that we use covers the standard convolution as well as many more. A reverse convolution inequality has also been discussed. We give an application of our inequalities, in particular, to find solution of heat equation in a wider class of solutions.

Symposium-V
EMERGING TOPICS IN DIFFERENTIAL EQUATIONS

1.ELLIPTIC EQUATIONS IN UNBOUNDED DOMAINS by Raghavendra V (Retired from IIT, Kanpur) Department of Mathematics, Indian institute of Technology, Tirupati-A.P., India (Email: vrag@iittp.ac.in)

I am thankful to the organizers of the symposium for giving me an opportunity to share with you a few results on Elliptic Equations in unbounded domains $\Omega \subset \Box^n$. Research in Elliptic Boundary value problems (and Partial Differential equations) has been of interest to many for more than 7 decades (or may be more). The problem of existence of solutions has a different flavour in unbounded domains due to the lack of Compact Embedding theorems. These problems are closely linked with Weighted Sobolev Spaces. Time permitting let us have a quick look at the existence of viscosity solutions of Fully nonlinear (elloptic type) equations.

2.CURRENT TRENDS IN NONLINEAR FRACTIONAL DIFFERENTIAL EQUATIONS, by Varsha Daftardar- Gejji Department of Mathematics, Savitribai Phule Pune University, Pune-411007, India (Email :vsgejji@unipune.ac.in)

Fractional calculus (FC) is a branch of Mathematics which deals with differentiation and integration of arbitrary orders and is ad old Calculus. Its origins can be traced back to the end of the seventeenth century, the time when Newton and Leibniz developed the foundations of differential and integral calculus. The subject has developed since then through pioneering works of Leibniz, Bernoulli, Euler, Lagrange, Abel, Reiemann, Liouvill and many others.

During the last three-four decades fractional calculus has witnesses rapid growth in pure mathematics as well as in scientific applications. In the present talk we introduce basic definitions of FC. Further we review developments in fractional differential equations and discuss the numerical methods to solve them. Finally we talk about fractional ordered nonlinear dynamical systems and elaborate on some results that we have obtained recently.

3.TWO-SCALE CONVERGENCE AND APPLICATION TO HOMOGENIZATION OF A HYPERBOLIC EQUATION by Nandakumaran, A. K. Department of Mathematics , Indian Institute of Science, Bangalore-560012, India

(Email :nands@maths.iisc.ernet.in)

The strong and weak convergence in Hillbert spce, in particular L^2 space is well known. But when we take a limit of a sequence, more specifically weak limit, the limit will loose lot of important information contained in the original sequence. For example, the weak limit of the sequence $\sin nx$ is 0, and we do not see the oscillation present in the sequence. Further, the product of two weakly convergent sequence do not converge to the product of the limit.This causes trouble at various stages of studying problems and doing the analysis. In this talk, we introduce the notion of two-scale convergence to retrieve certain lost information in relevance to homogenization theory and present the importance to two-scale convergence and a compactness theorem. In the second part, we apply it to study a homogenization problem in a highly composite media consisting of two highly contrasting materials which is modelled by a hyperbolic equation. We obtain the limiting problem and this is known as homogenization.

4.ERGODICITY OF STOCHASTIC NAVIER-STOKES EQUATIONS by K. Sakthivel (joint with M. T. Mohan and S. S. Sritharan) Department of Mathematics, Indian Nistitute of Technology(IIST), Trivandrum, Kerala., India (Email: pktsakthi@gmail.com)

The main aim of this talk is to discuss the ergodic properties of 3D stochastic Navier-Stokes equations (SNSE) subject to Levy type stochastic forces. The study of this model with general random noise is motivated by the engineering scenario where the flow field is often subjected to structural and environmental disturbances. We first construct a Markov family of martingale solutions for the 3D SNSE subject to Levy noise. It is then used to obtain the existence of a unique invariant measure, which is ergodic and strongly mixing. These results are established by proving suitable estimates for the Kolmogorov equations of partial intrgo-differential type involing Levy measure associated to the SNSE with Levy noise. The mild from of the Galerkin approximated Kolmogorov equations are obtained using the Feynman-Kac formula. Rigorous estimates for this semigroup are established by obtaining the derivative of the Feynman-Kac semigropu and Bismut-Elworthy-Li type formula derived for the SNSE with Levy noise. Several crucial higher order weighted estimates use in this context have been derived for the SNSE as well as the associated Kolmogorov equations using stochastic convolution estimates. The limiting solutions of the approximation Kolmogorov equation and that of the SNSE are combined to arrive at the required result.

5.DYNAMIC EQUATIONS ON TIME SCALE by Syed Abbas Indian Institute of Technology, Mendi., India.
Email: sabbas.iitk@gmail.com
Timescale calculus is a unification of the theory of difference equations with that of differential equations. It has applications in any field that requires simultaneous modelling of discrete and continuous data. In this talk, we discuss the qualitative theory of such equations. We mainly focus on oscillation criteria with some applications

Symposium-VI
DYNAMICS AND CHAOS AND FRACTALS

1.THE CHAOTIC DYNAMICS IN FOOD-CHAINS AND FOOD WEBS by Sunita Gakkhar Department of Mathematics, IIT, Roorkee (Email: sungkfma@gmail.com)

The multi-species food-chains / food-webs in ecological systems are mathematically represented as a dynamical system of nonlinear coupled differential equations. The

issues of survival, existence, extinction and persistence in biological communities are of concerned to ecologists. Mathematical answers to these questions lie in the stability of equilibrium points; limit cycles and periodic solutions of dynamical models. The instabilities of periodic solutions may lead to the occurrence of chaos. The chaos is observed in a food-chain comprising of three species and modeled as autonomous continuous system. The complex dynamics is expected in food-web models also as they involve much more complex multi-trophic-level interactions. The age structure in the population, time delay due to maturation and other such factors, seasonal variations and environmental effects may result in non-autonomous systems. The chaos may also be controlled and the order can be brought into the otherwise chaotic system. The chaotic dynamics and its control in ecological models will be discussed in this talk.

2.SHAPE PRESERVING RATIONAL GRAPH DIRECTED FRACTAL INTERPOLATION by A.K. B. Chand and K. R. Tyada Department of Mathematics, IIT Madras, Chennai 600036 (Email: chand@iitm.ac.in, kurmaths86@gmail.com)

Fractal interpolation technique provides subtle deterministic representations of complex phenomena through suitable choice of iterated function system (IFS). For modelling of correlated data simultaneously, Deniz and ö zdemir [Turk. J Math. 2017.41, 829−840] proposed the concept of graph-directed fractal interpolation functions (GDFIFs) that are not suitable for approximation of data sets from smooth functions with irregular derivatives. In this work, we propose the concept of - smooth GDFIFs by using rational functions through suitable choice of graph directed IFS. Further, we have identified the parameters of the graph directed IFS so that the resulting GDFIFs can be approximate positive and monotonic data simultaneously. The theoretical results are implemented through examples of shape preserving rational GDFIFs that are compared with the corresponding rational FIFs.

3.THE INDEPENDENCE FRACTALS OF GRAPHS WITH INDEPENDENCE NUMBER THREE by Tarakanta Nayak Department of Mathematics, IIT Bhubaneswar (Email: tnayak@iitbbs.ac.in)

An independent set of vertices is a set of pairwise non-adjacent vertices of a graph. If i_k denotes the number of independent sets of vertices of a graph G with cardinality k then the independence polynomial $I(G, z)$of $G$is defined as $i_0+i_1z+i_2z^2+\cdots+i_\alpha z^\alpha$ where α is the cardinality of the largest independent set of vertices, called the independence number of G. Let G^kdenote the k-times lexicographic product of G with itself. The set of roots of the independence polynomials of G^k is known to converge as $k \to \infty$, with respect to the Hausdorff metric and the limiting set is known as the independence fractal of the graph.

The independence fractals of graphs with independence number three are investigated. All such graphs whose independence fractals are intervals are completely characterized .

4.INTERPOLATION OF HYBRID STRUCTURES USING FRACTAL THEORY by Sirjanani Department of Mathematics, IIT Tirupati (Email: srijanani@iittp.ac.in)

Fractal interpolation Function is a novel method to construct irregular functions from interpolation data. The talk will begin with a brief introduction of Fractals and different kinds of Fractal Interpolation Functions. Then, I will introduce a special kind of Fractal Interpolation Function called Super Fractal Interpolation Function (SFIF) for finer simulation of the objects of the nature or outcomes of

scientific experiments that reveal one or more structure embedded into another (i.e., hybrid structures). We will look at construction of SFIF wherein, an Iterated Function System (IFS) is chosen from a pool of several IFS at each level of iteration leading to implementation of the desired randomness and variability in fractal interpolation of the given data. Further, I will discuss properties of integrability and differentiability of an SFIF. Finally, I will show a result on convergence of a Cubic Spline SFIF.

5.CHAOTIC DYNAMICS OF ENTIRE FUNCTIONS by M. Guru Prem Prasad Department of Mathematics, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India (Email: mgpp@iitg.ac.in)

Let $f : \square \to \square$ be a non-constant entire function where $\square$ is the complex plane. Denote by f^n the n-th iterate of f, that is $f^0(z) = z, f^n(z) = f(f^{n-1}(Z))$ for $n \geq 1$. The main objects studied in complex dynamics are the Fatou set $F(f)$ and the Julia set $J(f)$ of an entire function f. The Fatou set $F(f)$ is defined as the set of all points in the extended complex plane $\hat{\square} = \square \cup \{\infty\}$such that the sequence of iterates $\{f^n : n \in \square\}$ forms a normal family in some neighbourhood of z and the Julia set $J(f)$ is defined as $J(f) = \hat{\square}/F(f)$. The dynamics of polynomials has been completely understood. Even though the dynamics of transcendental entire functions is extensively studied. Still it is receiving increased interest due to many intricate and contrasting dynamical properties. For example, the chaotic burst in the Julia set occurs in the dynamics of transcendental functions where as the Julia set of polynomials are always compact. In this talk, we highlight the dynamical properties of transcendental entire functions that are in contrast to the dynamics of polynomials through various examples.

6.CONSTRAINED RATIONAL FRACTAL SURFACE WITH VARIABLE SEALING by K.M.Reddy and A.K.B.Chand Department of Mathematics, IIT Madras, Chennai-600036 (Email: mahipalnitw@gmail.com, chand@iitm.ac.in)

Smooth rational fractal interpolation function (RFIF) is a powerful tool to capture the irregularity associated with the derivative of a data generating function. In order to capture less self-referentiality associated with data generating function, a new type of rational α-fractal function with cubic numerators and linear denoinators is proposed in this work by using variable scaling functions. These univariate RFIFs are then used to construct fractal interpolation surfaces (FISs) through Coons technique. If the surface data is constrained by a piecewise linear surface, then we restrict the values of rational IFS parameters so that the resulting rational FIS will satisfy the constrained nature of data. Finally, the findings are demonstrated through the generation of constrained rational FISs with variable scaling.

IMS Prizes

IMS PRIZE-GROUP-1: DISCRETE MATHEMATICS, LATTICE THEORY, SET THEORY, LOGIC, NUMBER THEORY AND RELATED AREAS

1.A NOTE ON HARDYS THEOREM by Usha K. Sangale SRTM University, Nanded (M. S.) (Email: ushas073@gmail.com)

G. H. Hardy, in 1914, showed that the Riemann zeta-function $\zeta(s), s = \sigma + it$ as infinitely many zeros on the line $\sigma = \frac{1}{2}$. The proof of Hardys theorem involves estimating a certain integral both from above and below arrive at a contradiction by comparing these estimates. The estimation from below is straight forward for the

Riemann zeta function. However, obtaining good upper bound, which will lead to a contradiction, is a difficult problem! To obtain an optimal upper bound either one moves the line of the integration to the right or one use the approximate functional equation. In this talk, we will use a simple first approximation of $\zeta(\frac{1}{2}+it)$ and obtained the desired upper bound. This gives a new proof of the classical theorem of Hardy.

IMS PRIZE-GROUP-2: ALGEBRIC GEOMETRY, GEOMETRY, TOPOLOGY, ALGEBRIC TOPOLOGY AND RELATED AREAS

NIL

IMS PRIZE-GROUP-3: MEASURE THEORY, PROBABILITY THEORY, STOCHASTIC PROCESS AND RELATED AREAS.

NIL

IMS PRIZE-GROUP-4: DIFFERENTIAL/ INTEGRAL/ FUNCTIONAL EQUATIONS AND INEQUALITIES, SPECIAL FUNCTIONS, NUMERICAL ANALYSIS AND RELATED AREAS

1.SEMI LOCAL CONVERGENCE OF A COMPUTATIONALLY EFFICIENT EIGHTH ORDER METHOD IN BANACH SPACES UNDER W-CONTINUITY CONDITION by J.P.Jaiswal Department of Mathematics, Maulana Azad National Institute of Technology, Bhopal, M.P 462051, India (Email: asstprofjpmanit@gmail.com.)

The current paper is concerned with the study of semi-local convergence of an eighth-order method for solving nonlinear equations in Banach Spaces under mild condition. The existence and uniqueness theorem has been proved followed by the error estimates. At least, the application of theoretical development has been made in nonlinear integral equation

2.REPRESENTATION OF CONTINUOUS RIDGELET TRANSFORM WITH APPLICATIONS by Nitu Gupta, Department of Basic Science and Humanities, SVKMs NMINS, MPSTME, Vile Parle (W), Mumbai 400046, India (Email: nitu.gupta@nmims.edu)

This is a relook into the work developed by Candes exposing explicitly the integral representation in $L^2(\square^2)$, arising from translation and modulation of single function ridgelet shown to represent any function in $L^2(\square^2)$ in terms of coherent state. The elementary properties of ridgelet transforms are studied. Fourier transforms are ridgelet and ridgelet is also represented. Parsevals relations for the Ridgelet transforms and reconstruction formula are also studied in this paper. Relation between ridgelet and radon transforms is relooked with bivariate function. In the last section, the continuous ridgelet transforms are applied to the neural network problem

3.A NEW COHERENT FRACTIONAL ORDER PID CONTROLLER TO OPTIMIZE TRANSIENT RESPONSE FOR A TWO AREA INTERCONNECTED POWER SYSTEMS by Kocharlakota Satya Pritam BITS Pilani, Pilani Campus
Email: kspritam@gmail.com
In view of optimized rise time, overshoot and settling time of a controller, significant thrust has been given on Factorial ordered Proportional Integral Derivative controller (FOPID). Although, wide range of studies has been carried on FOPID, the dimensional instability associated with the mathematical expression of FOPID is not addressed yet. This study at endeavours to surmount the drawback of FOPID

with a proposal of Dimensional Balanced Fractional Order Proportional Integral Derivative (DBFOPID). The proposed controller has been tested on a two area inter connected power system. The optimized parametric values of the variables effecting rise time, overshoot and settling time are discussed. To exercise the optimum values of these parameters, integral of the time weighted absolute error (ITAE) performance index has been used. The results of DBFOPID controller systems are compared with integer order controlled Automatic Generation Control.

4.ON ${}_pR_q(\alpha, \beta, z)$ FUNCTIONS AND ITS PROPERTIES by Rachana Desai Department of Science and Humanities, K. J. Somaiya College of Engineering, University of Mumbai - 400077
Email: rachanadesai@somaiya.edu, rachana.132@gmail.com
The aim of present paper is to discuss the ${}_pR_q$ function with convergent condition and some properties including analytical property. Mellin-Barnes integral representations and contiguous relations.

IMS PRIZE-GROUP-5: SOLID MECHANICS, FLUID MECHANICS, ELCTROMAGNETIC THEORY, MAGNETO-HYDRODYNAMICS, ASTRONOMY, ASTROPHYSICS AND RELATED AREAS.

1.HOMOTOPY ANALYSIS FOR THE MHD FLOW WITH HEAT AND MASS TRANSFER DUE TO A POINT SINK by Chandrakant N. Guled Depatrment of Gen. Sci. And Engg., Wanchand Institute of Technology, Solapur(M.S.)-402103, India (Email: chandrakant.guled2gmail.com)

In this paper, an analytical solution of the magnetohydrodynamic steady incompressible laminar boundary layer flow in the presence of heat and mass transfer as well as magnetic field on a cone due to a point sink by using the homotopy analysis method (HAM) have been studied. The HAM produces an analytical solution of the governing self-similar nonlinear two point boundary layer equations. The effects of the suction/injection and magnetic parameters over the obtained solution have been discussed. The effects of Prandtl number on temperature and Schmidt number on concentration profiles have also been studied. The results obtained in the present study have also been compared numerically as well as graphically with the corresponding results obtained by using other methods. An excellent agreement has been found between them. The accuracy in the result is an indicative of the fact that the HAM aided by computing Softwares like MATHEMATICA, Maple, ect. is a proficient and easily applicable technique for solving ordinary differential equations with strong non linearity, and hence may be used widely for solving non linear problems of physical significance in science and engineering. The analytical solution by the HAM is very near to the exact solution for a properly selected for initial guess, auxiliary and convergence control parameters and for higher order of deformations.

2.WKB APPROXIMATION FOR DISPERSION OF LOVE TYPE WAVE IN SMART COMPOSITE STRUCTURE by Juhi Baroi Department of Mathematics, Indian Institute of Technology (Indian School of Mines) Dhanbad, India (Email: juhibaroi@gmail.com)

An analytical solution for propagation of Love type waves in a smart composite structure is proposed, using Wentzel-Kramers-Brillouin(WKB) method. The composite structure is made of functionally Graded Piezo-magnetic Material (FGPM) layer laying over a piezomagnetic half-space. The material properties of FGPM layer varying linear along the thickness direction. The dispersion in determined

form is calculated for both magnetically open and short cases. Numerically example and graphically representation have been made to illustrate the effects of gradient factor, width of the FGPM layer on the phase velocity of Love type waves. Finally, the outcomes of the present study is matched with classical Love wave result. Obtained solution may be utilized for theoretical optimization of structured of devices made of piezo composites

3.LOVE-TYPE SURFACE WAVES IN A NON LOCAL NON-VOIGT ELASTIC LAYER WITH VOIDS by Gurwinderpal Kaur Department of Mathematics, Panjab University, Chandigarh, India (Email: grewalgk1991@gmail.com)

In this paper, the propagation of Love-type surface waves in a layer of finite thickness resting over a solid half-space consisting of nonlocal non-voigt elastic media with voids has been studied. The theory of nonlocal elastic solids with voids given by Singh et al.(2017) has been used for the study. Dispersion relation of Love type waves has been derived using approximate boundary condition at free surface and at the inter face. It is found that there exist two fronts of Love type surface waves which can travel with distinct speeds. Both the fronts are dispersive and non-atteinuating in nature and are influenced by the presence of nonlocality in the media. The first front of Love type waves is found to be independent of voide parameters and is analogous to Love waves in classical elasticity while the second front to be dependent on presence of void parameters in the media. It is also observed that the second front of Love type waves faces a cut off frequency below which it is distance decaying vibrations only and beyond cut-off frequency it is propagation wave. Both the fronts face critical frequencies above which the case to propagate. For a particular model, the variation of speeds of both the fronts of Love type waves with frequency and nonlocal parameter has been studied numerically

4.DARCY BENARD CONVECTION NEWTONIAN LIQUIDS IN AN ANNULAR REGION by K.M. Lakshmi Department of Mathematics, Bangalore University, Bangalore 560056, India (Email: lakshmikmmaths@gmail.com)

Darcy-Benard convection in an annular region between the two concentric cylinders filled with liquid-saturated porous medium is investigated analytically. The annular region is assumed to be bounded by impermeable, isothermal horizontal boundaries and insulated vertical boundaries. Water and Ethylene Glycol liquids are used for study. An axi-symmeric mode of convection in considered and the resulting eigen value problem is reduced to standard Helmholtz equations. A linear stability analysis based on normal mode is used to determine the critical Rayleigh number for the one set of convection. From the study we found that the critical Rayleigh number is a smooth function of wave number and aspect ratio. Different values of inner and outer radii are considered to determine the range of aspect ratio for which the unicellular and multicellular convection manifests. Results of rectangular enclosures is recovered from the study by discounting the curvature effects. Results of Rayleigh Benard convection in circular cylinders also obtained by considering the inner radius as zero. Lorenz model and Ginzeburg-Landau equations are derived to investigate the heat transport by weakly non stability analysis.

5.NORMALIZATION OF HAMILTONIAN IN THE RESTRICTED THREE BODY PROBLEM WITH OBLATE PRIMARIES by Ram Kishor Central University of Rajasthan, Bandarsindari, Krishnagarh-305817, Rajasthan, India (Email: kishore.ram888@gmail.com)

The normalized Hamiltonian of a dynamical system is an important aspect to analyze the nonlinear motion in the vicinity of equilibrium points. This paper focuses

on the computation of first order normalized Hamiltonian also, known as diagonalized Hamiltonian in the neighbourhood of collinear equilibrium points, in the restricted three body problem with oblate primaries. To achieve the goal, first, we have formulated the problem, expanded the Hamiltonian about the equilibrium points in terms of Legendre polynomial and then applied normalization scheme. Finally, we have obtained normalized Hamiltonian of the proposed problem, which is useful, moreover, first and important step of the computation of centre manifold

6.STUDY OF TAYLOR-BENARD CONVECTION OF A NEWTONIAN NANOLIQUID IN AN ANISOTROPIC POROUS MEDIUM USING GENERAL BOUNDARY CONDITIONS by T.N.Sakshath Department of Mathematics, Bangalore University, Jnana Bharathi Campus, Bangalore 560056, India (Email: sakshath.tn@gmail.com)

In the paper we study Taylor-Benard convection of a Newtonian nanoliquid-saturated anisotropic porous medium. The study is carried out using general boundary conditions. The influence of various parameters on the onset of convection has been presented graphically and discussed in detail. It is found that the effect of increasing the rotation rate and thermal anisotropy parameter is to stabilize the system whereas mechanical anisotropy parameter destabilizes the system. Results of 32 different problems are obtained as limiting cases of the present study

7.SOLUTIONS TO THE CUBIC GINZBURG-LANDAU EQUATION AS A TIME SERIES by Shreti Garg Department of Mathematics, Bangalore University, Jnana Bharathi Campus, Bangalore 560056, India (Email: shretigarg18@gmail.com)

In this paper the cubic Ginzburg-Landau equation is solved by the differential transform method to obtain a time series solution. The region of convergence is determined with the help of a Domb-Sykes Plot. In order to find the solution at points outside the radius of convergence, the rational approximation of Pade is used. The results obtained show that the elegant technique introduced here yields a solution that is in good agreement with the exact solution

8.STABILITY ANALYSIS OF THERMAL CONDUCTION IN A ROTATING LIQUID-SATURATED SPARSELY PACKED POROUS MEDIUM WITH LTNE EFFECTS by C. Siddabasappa Department of Mathematics, Bangalore University, Jnana Bharathi Campus, Bangalore 560056, India (Email: apmath91@gmail.com)

In this paper Kuppers-Lortz (KL) instability is studied in the problem of rotating Bingham-Bendard convection in the absence of local thermal equilibrium is studied. The critical angle between the rolls and Taylor number for the existence of the KL instability is reported. The individual effects of Brinkman number, porous parameter, ratio of thermal conductivities and inter-phase heat transfer coefficient on onset of KL instability for large values of Prandtl number is presented.

9.STUDY OF LOCAL THERMAL NON-EQUILIBRIUM EFFECTS ON NATURAL CONVECTION OF NANOLIQUID IN VERTICAL POROUS ENCLOSURES USING SINGLE-PHASE MODEL by Veena B.N Bangalore University (Email: mvymath@gmail.com)

Natural convection of nanoliquid in vertical porous enclosure is studied by subjecting the vertical walls to constant heat flux under local thermal non equilibrium (LTNE) assumptions. Water, copper nanoparticles and porous material made of either aluminium foam or glass balls are considered in the study. Thermophysical

properties of nanoliquid and nanoliquid-saturated porous medium are modelled using phenomenological laws on mixture theory. An analytical expression for velocity and temperature profiles of nanoliquid and solid phases as been obtained. Weighted average Nusselt number is expressed as a function of aspect ratio, volume fraction and properties concerning LTNE effects. An LTNE effect is shown to be a heat transfer enhancing mechanism. The presence of nanoparticles is to enhance the heat transport in water. LTE results are obtained as limiting case of the present study.

IMS PRIZE-GROUP-6: OPERATIONS RESEARCH, OPTIMIZATION, COMPUTATIONAL MATHEMATICS, INFORMATION TECHNOLOGY, BIOMATHEMATICS, HISTORY OF MATHEMATICS AND RELATED AREAS

NIL.

AMU PRIZE ALGEBRA, DIFFERENTIAL GEOMETRY AND FUNCTIONAL ANALYSIS AND RELATED AREAS

1.FINITE P-GROUPS HAVING SCHUR MULTIPLIER OF MAXIMUM ORDER by Sumana Hatui Harish-Chandra Research Institute, Allahabad, India (Email :sumana.iitg@gmail.com, sumanahatui@hri.res.in)

Let G be a non-abelian p-group of order p^n and $M(G)$ denote the Schur multiplier of G. Niroomand proved that $|M(G)| \leq p^{\frac{1}{2}(n+k-2)(n-k-1)+1}$ for non-abelian P-groups G of order p^n with derived subgroup of order p^k. Recently, Rai classified p- groups G of nilpotency class 2 for which $|M(G)|$ attains this bound. In this article we show that there is no finite p-group G of nilpotency class $c \geq 3$ for $p \neq 3$ such that $|M(G)|$ attains this bound. Hence $|M(G)| \leq p^{\frac{1}{2}(n+k-2)(n-k-1)+1}$ for P-groups G class $c \geq 3$ where $p \neq 3$. We also construct a p- group for $p = 3$ such that $|M(G)|$ attains the Niroomands bound.

2.NONLINEAR CONTRACTIONS AND DISCONTINUITY AT FIXED POINT by Ravindra K. Bisht Department of Mathematics, National Defence Academy, Pune, India (E-mail: ravindra.bisht@yahoo.com)

In this paper, we provide one more affirmative answer to the open question posed by Rhoades [Contractive definitions and continuity, Contemporary Mathematics 72(1988), 233-245] concerning existence of a contractive definition which is strong enough to generate a fixed point but does not force the mapping to be continuous at the fixed point

V.M.SHAH PRIZE: REAL ANALYSIS, COMPLEX ANALYSIS, FOURIER ANALYSIS, HORMONIC ANALYSIS, APPROXIMATION THEORY AND RELATED AREAS

1.ON THE CARDINALITY OF UNIQUE RANGE SETS WITH WEIGHT ONE by Bikash Chakraborty Ramakrishna Mission Vivakananda Centenary College (Email: bikashchakraborty.math@yahoo.com)

Two meromorphic functions f and g are said to share the set $S \subset \square \cup \{\infty\}$with weight $l \in \square \cup \{0\} \cup \{\infty\}$ if $E_f(S,l) = E_g(S,l)$ where $E_f(S,l) = \bigcup_{a \in S}\{(z,t) \in \square \times \square f(Z) = awithmultiplicityp\}$ where $t = p$ if $p \leq l$ and $t = p+1$ if $p > 1$. In this paper, we established that there exist a finite set s with cardinality greater equal to 13 such that $E_f(S,1) = E_g(S,1)$ implies. $f \equiv g$.Our result improved the result of L.W.Liao and C.C.Yang (on the cardinality of the unique range sets for meromorphic and entire functions, Indian J.Pure appl.Math., 31(4)(2000), 431-440).

2.ON BORNOLOGICAL SPACES OF ENTIRE FUNCTIONS REPRESENTED BY DIRICHLET SERIES HAVING FINITE GOLDBERG ORDER by Nibha Dua Netaji Institute of Technology, Dwaraka, New Delhi (Email: nibha.dua06@gmail.com)

The study of entire functions represented by Dirichlet Series has been studied earlier by many workers. P. K. Sarkar has successfully studied Goldberg order of an entire function. Through this paper, we aim to study the bornological aspects of the space of all entire Dirichlet Series of $f(s) = \sum_{n=1}^{\infty} a_n e^{\lambda_n s}$having finite Goldberg order

IMS PAPER PRESENTATIONS

SECTION A: COMBINATORICS, GRAPH THEORY AND DISCRETE MATHEMATICS

1.CHANGING AND UNCHANGING EFFICIENT DOMINATION IN GRAPHS WITH RESPECT TO VERTEX CRITICALITY by B. Senthil Thilak, Sujatha V Shet, S.S. Kamath Department of Mathematical and Computational Sciences National Institute of Technology, Karnataka, Surathkal, Mangalore, India (Email: sujashet@gmail.com)

A dominating set S of a group G is said to be an efficient dominating set (EDS) of G if $|N[v] \cap S| = 1$, for all $v \epsilon V(G)$ and G is said to be efficiently dominatable or efficient if it has an EDS. Not all groups are efficient. Here, by ϵ, we denote the family of graphs which are efficient. In this paper, we have initiated the study of changing and unchanging efficient domination in graphs with respect to vertex critically. In general, if a graph G is efficient, then any EDS of G has the same cordiality has its domination number. In this paper, we have studied the properties of efficient graphs which belongs to the classes unchanging vertex removal(UVR) and changing vertex removal (CVR). That is, the properties of those graphs belonging to the classes $UVR_E = UVR \cap \epsilon$ and $CVR_E = CVR \cap \epsilon$ are discussed. We have characterized the classes UVR_E and CVR_E and also characterized the critical sets V^0, V^+ and V^- for any graph $G \in \epsilon$. We have also conjectured that for any graph $G \in \epsilon$, the sets V^+ and V^- do not exit simultaneously and the proof has been attempted for the case, $\gamma(G) \leq 2$.

2.IMAGE PARTITION REGULARITY OVER THE GAUSSIAN INTEGERS by Subhajit Jana and Dibyendu De University of Kalyani, W. B. (Email: suja12345@gmail.com)

A $u \times v$ matrices A with entries from $\square$ is image partition regular provided that, whenever $\square$ is finitely partitioned, there is some $\vec{x} \in \square^v$ with all entries of $A\vec{x}$ belong into same partition. Image partition regular matrices are natural tools for representing some classical theorems of Ramsey theory, likes of Hilbert, Schur, Van der Waerden theorems etc. Many of the natural analogues of known characterizations of image partition regularity of finite matrices with rational entries over the integers has been generalized for matrices with entries from reals over the ring of $(R, +)$ by Hindman. In both the case of reals and integers, usual ordering played an important role. In the present work we shall prove that natural analogues of known characterizations of image partition regularity of finite matrices with rational entries over the integers are also valid for matrices with entries from *Gaussianrationals* $\square[i]$ over the ring of Gaussian integers $\square[i]$. Main hurdle for this generalization is the absence of ordering, and to overcome this hurdle we need some modifications of established techniques. We also prove that Milliken-Taylor Matrices with entries

from $\square[i]$ are also image partition regular over $\square[i]$.

3.CONVEXITY OF DOMINATING FUNCTIONS OF CORONA GRAPHS by M.Siva Parvathi, B.Maheswari Dept. of Applied Mathematics, Sri Padmavati Mahila Visvavidyalayam, Tirupati-517502, Andhra Pradesh, India (Email: parvathimani2008@gmail.com)

Let $G(V, E)$ be a graph. A subset D of V is said to be a dominating set (DS) of G if every vertex in VD is adjacent to some vertex in D. A dominating set D is called a minimal dominating set (MDS) if no proper subset of D is a dominating set of G. Let $G(V, E)$ be a graph. A function $f : V \to [0, 1]$ is called a dominating function (DF) of G if $f(N[v]) = \sum_{u \in N[v]} f(u) \geq 1$ for each $v \in V$, where $N[v]$ is the closed neighbourhood of the vertex v. A dominating function f of G is called minimal dominating function (MDF) if for all $g < f$, g is not a dominating function. Let $G(V, E)$ be a graph. Let f and g be two functions from V to $[0, 1]$ and $\lambda \in (0, 1)$. Then the function $h : V \to [0, 1]$ defined by $h(v) = \lambda f(v) + (1 - \lambda)g(v)$ is called a convex combination of f and g. In this paper we study the convexity of minimal dominating functions of corona of some standard graphs.

4.b-COLORING OF GROTZSCH GRAPH AND HELM GRAPH by B.Ramesh PSG College of Arts and Science, Coimabtore, Tamilnadu 641014, INDIA (Email: rameshvenkat1993@gmail.com)

b-Coloring of Grotzsch graph and Helm graph. In this paper I found that b-chromatic number of Grotzsch graph and Helm graph

5.TO FIND THE COMPARSION OF DOMINATION NUMBER, RADIUS AND DIAMETER OF CIRCULAR ARC-GRAPH G by A. Sudhakaraiah, T.Visalakshi Department of Mathematics, S.V.University, Tirupati, A.P., India-517502 (Email: sudhakarmath.svu@gmail.com)

Few subjects in mathematics have as specified an origin as graph theory. Graph theory originated with the Konigsberg Bridge Problem, which Leonhard Euler solved in 1736. Over the past sixty years, there has been a great deal of exploration in the area of graph theory. Its popularity has increased due to its many modern day applications in Circular arc-graphs corresponding to circular arc family and it has become the source of interest to many researchers. Circular graphs are intersection graphs of arcs on a circle. These graphs are reported to have been studied since 1964, and they have been receiving considerable attention since a series of papers by Tucker in the 1970s. In the present paper we presented the Comparison of Domination Number, Radius and Diameter of Circular- Arc Graph G.

6.CERTAIN RESULTS ON INEQUALITIES OF FUZZY MATRICES by S. Sriram and J. Boobalan Mathematics Wing, Directorate of Distance Education, Annamalai University, Annamalainagar 608 002 Email: ssm_3096@yahoo.co.in Department of Mathematics, Manbumingu Dr. Puratchithalaivar M.G.R. Goverment Arts and Science College, Kattumannarkoil 608 301,India (Email: jboobalan@hotmail.com)

In this paper, we prove some new inequalities of fuzzy matrices by using the operations algebraic product $\otimes$ and algebraic sum $\oplus$. From these inequalities, we can have $A \otimes B \leq A \wedge B \leq A \vee B \leq A \oplus B$.

7.ON THE ADDITIVE AND MULTIPLICATIVE STRUCTURES OF REGULARITY AND UNIT ELEMENT byM. Amala and N. Sulochana Department of Applied Mathematics, Yogi Vemana University, Kadapa, Andhra Pradesh, India Department of Mathematics, K.S.R.M. College of Engineering,

Kadapa, Andhra Pradesh, India (Email: amalamaduri@gmail.com, sulochanagam@gmail.com)

In this paper, we study the structures of semirings. Additive and Multiplicative structures play an important role in determining the structure of totally ordered semirings. In semirings it is possible to derive the additive structures from their special multiplicative structures and vice-versa. In this paper, in first section we have shown that let S be a semiring and $'a'$ be additively completely regular element. If $(S, \square)$ a band, then S contains additively periodic elements. In last section it was proved that $(S, +)$is a band under the following two cases.
(i) If S is a Unit Semiring and multiplicatively subidempotent semiring,
(ii)If $'a'$ in S is a Unit element and additively idempotent element in a semiring S.

SECTION B: ALGEBRA, NUMBER THEORY AND LATTICE THEORY

1.ON A THEOREM OF MAHLER by Nabin Kumar Meher, R. Thangadurai, K. Senthil Kumar. HRI, Allahabad, NISER, Bhubaneswar (Email: mehernabin@gmail.com)

Let $b \geq 2$ be an integer and α be a non-zero real number written in base b. In 1973, Mahler proved the following result. Let α be an irrational number written in base b and let $n \geq 1$ be a given integer. Let $B = b_0 b_1 ... b_{n-1}$ be a given block of digits in base b of length n. Then, there exists an integer X with $1 \leq X < b^{2n+1}$ such that B occurs infinitely often in the base b representation of the fractional part of $\{X\alpha\}$. In this short note, we deal with some conditional quantitative version of this result.

2.ARITHMETIC IDENTITIES OF RAMANUJANS GENERAL PARTITION FUNCTION FOR MODULO 17 by Belakavadi Radhakrishna Srivatsa Kumar and Shruthi Department of Mathematics, Manipal Institute of Technology, Manipal University, Manipal - 576 104, India. Netrajyothi College of Optometry and Paramedical Science, Udyavara, Udupi - 574 118, India.
Email: shruthikarranth@gmail.com
In this paper, we prove many infinite families of congruences modulo 17 for the general partition function $p_r(n)$ for negative values of r. Our emphasis throughout this paper is to exhibit the use of q-identities to generate con-gruences for general partition function.

3.FINITE P-GROUPS OF CONJUGATE TYPE $\{1, P^3\}$ by Tushar Kanta Naik, Manoj K. Yadav Harish-Chandra Research Institute, Allahabad, India.
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A finite group G is said to be of conjugate type $\{m_1, m_2, ..., m_n\}$, if the set of conjugacy class sizes of G is $\{m_1, m_2, ..., m_n\}$. Finite groups of conjugate type $\{1, n\}$ were first investigated by Ito in 1953. He proved that if G is of conjugate type $\{1, n\}$, then n is a power of some prime p and G is a direct product of a non-abelian Sylow p-subgroup and an abelian p'-subgroup; in particular G is nilpotent. Hence, to understand such groups, it is sufficient to study finite p-groups of conjugate type $\{1, p^n\}$ for $n \geq 1$. Half a century later, Ishikawa proved that finite p-groups of conjugate type $\{1, p^n\}$ can have nilpotency class at most 3. In a different paper, he classified p-groups of conjugate type $\{1, p\}$ and $\{1, p^2\}$ upto isoclinism. In this talk, we present a classification of finite p-groups of conjugate type $\{1, p^3\}$ upto isoclinism.

4.NEAR-RINGS WITH STRONG REGULARITY by M. K. MANORANJAN Associate Professor, Deptt. of Mathematics T.P. College, Madhepura- 852113
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In this paper we shall investigate some properties of left regular and strongly reduced near-rings. The purpose is to find some characterizations of strong reducibility in near-rings and the strong regularity in near-rings which are closely related with strongly reduced near-rings. A near-ring is said to be left regular if for each $a \in R$, there exists $x \in R$ such that $a = xa^2$. A near-ring is said to be k-regular if for each $a \in R$, there exist a positive integer n and an element $x \in R$ such that $a^n = xa^{n+1}$. A near-ring is called strongly left regular if R is left regular and regular. A strongly left regular and strongly right regular near-ring is called strongly regular near-ring. Equivalently left and right regularity implies strong regularity. Also the concept of left, strongly left, strongly right and strong regularities are all equivalent conditions. An idempotent element $e^2 = e$ in R is called left semi-central if $ea = eae$ for each $a \epsilon R$. Right semi-centrality is defined in a symmetric way. A near-ring in which idempotent is left semi-central is called semi-central. A near-ring R is reduced if R has no non-zero nilpotent elements. That is, for each a in R, $a^n = 0$ for some positive integer n implies $a = 0$. A near-ring R is strongly reduced, if for each $a \in R$,$a^2 \in R$that is $a0 = a^2$ implies $a0 = a$. We find that a strongly regular near-ring is reduced and every strongly reduced near-ring is reduced.

5.THE $\mathcal{F}_{1,2}$- CONTINUED FRACTION EXPANSION OF $e^{1/2s}$ by Seema Kushwaha Harish-Chandra Research Institute, Allahabad.
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For $l \leq 1$, a finite continued fraction of the form

$$\frac{1}{0+}\frac{2^l}{b+}\frac{\epsilon_1}{a_1+}\frac{\epsilon_2}{a_2+}\cdots\frac{\epsilon_n}{a_n}(n \geq 0)$$

or an infinite continued fraction of the form

$$\frac{1}{0+}\frac{2^l}{b+}\frac{\epsilon_1}{a_1+}\frac{\epsilon_2}{a_2+}\cdots\frac{\epsilon_n}{a_n+}\cdots$$

where b is an odd integer, $a_1, a_2, \ldots \epsilon 2N$, and $\epsilon_1, \epsilon_2, \cdots \in \{\pm 1\}$, is called an $\mathcal{F}_{1,2}$-continued fraction. These continued fractions satisfy many properties analogous to regular continued fractions. Similar to regular continued fraction, the $\mathcal{F}_{1,2}$-continued fraction $e^{1/s}$ follow a pattern.

In this note, we give a proof of the $\mathcal{F}_{1,2}$-continued fraction expansion of $e^{1/2s}$, where s is a positive integer. We find the regular continued fraction expansion of $2e^{1/2s}$ and we convert the $\mathcal{F}_{1,2}$-continued fraction to its regular form.

6.A TRANSCENDENCE CRITERION FOR CANTOR SERIES by Veekesh Kumar Harish-Chandra Research Institute, Allahabad, India.
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Let $Q = (b_n)_{n\geq 1}$ equence of positive integers with $b_n \geq 2$ for all integers n. Let α be a non-zero real number written in Q-ary expansion. In 2007, Adamczewski and Bugeaud proved, under some conditions, that given two real numbers written in b-ary expansion are either they are equivalent or one of them is a transcendental number, using Subspace theorem. In this article, we prove similar results for real numbers written in Q-ary expansion.

7.ARITHMETIC PROPERTIES OF 3-REGULAR BIPARTITIONS WITH DESIGNATED SUMMANDS by M. S. Mahadeva Naika and S. Shivaprasada Nayaka Bangalore University.
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Recently Andrews, Lewis and Lovejoy introduced the partition functions $PD(n)$ defined by the number of partitions of n with designated summands and they found several modulo 3 and 4. In this paper, we find several congruences modulo 3 and 4 for$PBD_3(n)$, which represents the number of 3-regular bi-partitions of n with designated summands. For example, for each $n \geq 1$ and $\alpha \geq 0 PBD_3(4.3^{\alpha+2}n + 10.3^{\alpha+1}) \equiv 0(mod 3)$.

8.PSEUDOCOMPLEMENTATION ON THE LATTICE OF CONVEX SUBLATTICES OF A LATTICE by R. M. Hafizur Rahman Department of Mathematics, Faculty of Science, Begum Rokeya University, Rangpur-5404, Bangladesh.
E-mail: salim030659@yahoo.com
By a new partial ordering relation $\leq$ the set of convex sublattices $CS(L)$ of a lattice L is again a lattice. In this paper we establish some results on the pseudocomplementation of $(CS(L); \leq)$. We show that a lattice L with 0 is dense if and only if $CS(L)$ is dense. Then we prove that a finite distributive lattice is a Stone lattice if and only if $CS(L)$ is Stone. We also prove that an upper continuous lattice L is a Stone lattice if and only if $CS(L)$ is Stone

9.STONE N-IDEALS IN A DISTRIBUTIVE LATTICES by Md. Abdul Latif Department of Mathematics, Rajshahi University, Rajshahi, Bangladesh.
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Stone n-ideals play an important role in the theory of algebras, because they are the kernels of the homomorphism into the simple algebras and also play a role in different problems. In this paper, we give a necessary and sufficient condition that a prime n-ideal of a sub lattice generates a prime n-ideal of a lattice. Finally, we give an application of our results to the characterizations of Stone lattices.

10.MULTIPLIERS OF NILPOTENT LIE SUPERALGEBRAS by Saudamini Nayak Harish-Chandra Research Institute Allahabad.
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In this paper, first we prove that all finite dimensional special Heisenberg Lie superalgebras with even center have same dimension, say $(2m + 1|n)$ for some non-negative integers m, n and are isomorphism with them. Further, for a nilpotent Lie superalgebra L of dimension $(m|n)$ and $\dim(L') = (r|s)$ with $r + s \geq 1$, we find the upper bound $\dim M(L) \leq \frac{1}{2}.\ [(m + n + r + s - 2)(m + n - r - s - 1)] + n + 1$, where $M(L)$ denotes the Schur multiplier of L. Moreover, if $(r, s) = (1, 0)$ (respectively$(r, s) = (0, 1)$), then the equality holds if and only if $LH(1, 0) + A_1$ (respectively $H(0, 1) + A_2$), where A_1 and A_2 are abelian Lie superalgebras with $\dim A_1 = (m - 3|n)$ and $\dim A_2 = (m - 1|n - 1)$ and $H(1, 0), H(0, 1)$ are special Heisenberg Lie superalgebras of dimension 2.

11.ON CYCLIC AND NEGACYCLIC CODES OF LENGTH $8l^m p^n$ OVER FINITE FIELD by Saroj Rani Department of Mathematics Harish-Chandra Research Institute (HRI) Allahabad 211019, India
Let Fq be finite field with q elements, where q is power of an odd prime p. In this paper, we determine generator polynomials of all cyclic and negacyclic codes of length $8l^m p^n$ over Fq, where p, l are distinct odd primes and m, n are positive integers. We also determine all self-dual, self-orthogonal, complementary-dual cyclic and negacycliccodes of length $8l^m p^n$ over Fq.

12.CONVEX AND WEAKLY CONVEX SUBSETS OF A PSEUDO ORDERED SET by Prashantha Rao, Shashirekha B. Rai Sahyadri College of Engineering & Management, Adyar, Mangalore, NMAM Institute of Technology, Nitte.
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In this paper the notion of convex and weakly convex (w-convex) subsets of a pseudo ordered set is introduced and several characterizations are proved. It is proved that set of all convex subsets of a pseudo ordered set A forms a complete lattice. Notion of isomorphism of psosets is introduced and characterization for convex isomorphic psoset is obtained. It is proved that lattice of all w-convex subsets of a pseudo

ordered set A denoted by $WCS(A)$ is lower semi modular. Also we have proved that for any two pseudo ordered sets A and A^1, w-convex homomorphism maps atoms of $WCS(A)$ to atoms of WCS (A^1). Concept of path preserving mapping is introduced in a pseudo ordered set and it is proved that every mapping of a pseudo ordered set A to itself is path preserving if and only if A is a cycle.

13.NON-WIEFERICH PRIMES IN NUMBER FIELDS AND ABC CONJECTURE by Srinivas Kotyada and Subramani Muthukrishnan Institute of Mathematical Sciences, Chennai . Harish Chandra Research Institute, Allahabad.
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Let $K/\mathbb{Q}$ be an algebraic number field of class number one and $\mathcal{O}_k$ be its ring of integers. We show that there are infinitely many non-Wieferich primes with respect to certain units in $\mathcal{O}_k$ under the assumption of the *abc* conjecture for number fields. This is a joint work with Srinivas Kotyada..

14.ON THE FAMILY OF ELLIPTIC CURVES $y^2 = x^3 - m^2x + p^2$ by Abhishek Juyal, Shiv Datt Kumar Motilal Nehru National Institute of Technology, Allahabad, India.
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We study the torsion subgroup and rank of elliptic curves for the subfamilies of $E_{m,p} : y^2 = x^3 - m^2x + p^2$, where m is a positive integer and p is a prime. We prove that for any prime p, the torsion subgroup of $E_{m,p}(\mathbb{Q})$ is trivial for both the cases $\{m \geq 1, m \equiv 0(mod3)\}$ and $\{m \geq 1, m \equiv 0(mod3)$,with $\gcd(m, p) = 1\}$. We also show that given any odd prime p and for any positive integer m with $m \not\equiv 0(mod3)$ and $m \equiv 2(mod32)$, the lower bound for the rank of $E_{m,p}(\mathbb{Q})$ is 2. Finally we find curves of rank 9 in this family.

15.RABIN-MILLER TEST IN A RSA **PUBIC KEY CRYPTOSYSTEM** by L. Sreenivasulu Reddy Department of Mathematics, Sri Venkateswara University, Tiruapti-517 502, A.P, India.
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In this paper, RSA type of Public key cryptosystem is designed based on Rabin-Miller test known as $RM - RSA$ cryptosystem. The efficiency of the $RM - RSA$ cryptosystem is nearly four times of the efficiency of basic RSA cryptosystem which is proved mathematically and is shown graphically with an illustration. Also, the Performance of this system is measured in terms of big-θ notation for best approximation. This paper also describes and measures the capability of four basic attacks on $RM - RSA$ cryptosystem.

16.VIBRATIONAL FREQUENCIES OF CARBONYL SULPHIDE USING $U(2)$ **LIE ALGEBRAIC METHOD** by J. Vijayasekhar Department of Mathematics, GITAM University, Hyderabad, India
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In this paper, we have calculated vibrational frequencies of Carbonyl sulphide (OCS) in fundamental level and at higher overtones using Hamiltonian expression, which is in terms of invariant and Majorana operators, describe stretching vibrations. The Hamiltonian is an algebraic one and so far all the operations in this method, unlike the more familiar differential operators of wave mechanics.

17.A PAIRING FREE IDENTITY BASED SIGNATURE SCHEME SUPPORTING BATCH VERIFICATION by N. B. Gayathri, P. Vasudeva Reddy, Department of Engineering Mathematics, Andhra University, Visakhapatnam, A.P, India.
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Nowadays electronic communication is ubiquitous and irreplaceable. Digital signature has become an integral part of these communications. Digital signature is a cryptographic primitive which provides authentication, integrity and non-repudiation for digital communications. Digital signatures have expanded rapidly along with mathematical advances in lattices, pairings and elliptic curves. Due to their high efficiency and strong security properties, the elliptic curve cryptographic schemes remain the best option for many security goals. Many signature schemes have been proposed in traditional Public Key Infrastructure, ID-based settings. Most of the ID-based schemes are using bilinear pairings over elliptic curves. But the computation of a bilinear pairing is very expensive. Also Batch verification process accelerates the speed of verification of multiple signatures. Batch verification technique reduces the computation cost and time in verification process, by verifying multiple signatures in a single instance instead of verifying them sequentially. In order to improve the computational and communicational efficiency, in this paper, first we propose a secure and efficient pairing free identity-based signature scheme and then extended it to achieve efficient batch verification. We show that these schemes are provable secure under the assumption that the Elliptic Curve Discrete Logarithm Problem is hard.We compare the efficiency of our schemes with the related schemes.

18.DUADIC CODES OVER A FINITE NON-CHAIN RING AND THEIR GRAY IMAGES by Mokshi Goyal and Madhu Raka, Centre for Advanced Study in Mathematics, Panjab University, Chandigarh-160014, INDIA.
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Let $f(u)$ be a polynomial of degree m which splits into distinct linear factors over a finite field$\mathbb{F}_q$. Let $\mathcal{R} = \mathbb{F}_q[u]/ < f(u) >$ be a finite non-chain ring. In this paper, we study duadic codes and their extensions over the ring $\mathcal{R}$. A Gray map from $\mathcal{R}^n$ to $(\mathbb{F}_q^m)^n$is defined which preserves self duality of linear codes. As a consequence self-dual, isodual, self-orthogonal and complementary dual(LCD) codes over $\mathbb{F}_q$ are constructed. Some examples are also given to illustrate this.

19.COMMUTATOR AND ANTI-COMMUTATOR IDENTITIES INVOLVING DERIVATIONS AND GENERALIZED DERIVATIONS IN PRIME AND SEMIPRIME RINGS by Mohammad Ashraf and Sajad Ahmad Pary Department of Mathematics Aligarh Muslim University Aligarh -202002(India)
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In the present paper, we investigate the action of derivation d and a generalized derivation F in a semi(-prime) ring $\mathcal{R}$ which satisfies differential identities involving commutator and anti-commutator for a nonzero ideal I of $\mathcal{R}$

20.HAMILTONIAN PROPERTY OF INTERSECTION GRAPH OF ZERO-DIVISORS OF THE RING Z_n by Shaik Sajana and D. Bharathi Department of Mathematics, S.V. University, Tirupati, A.P, India-517502.
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The intersection graph $G'_z(Z_n)$ of zero-divisors of the ring Z_n, the ring of integers modulo n is a simple undirected graph with the vertex set is $Z(Z_n)^* = Z(Z_n)/\{0\}$, the set of all nonzero zero-divisors of the ring Z_n and for any two distinct vertices are adjacent if and only if their corresponding principal ideals have a nonzero intersection. i.e., x is adjacent to y if and only if $(x) \cap (y) \neq 0$. We determine some results concerning the necessary and sufficient condition for the graph $G'_z(Z_n)$ is Hamiltonian. Also, we investigate for all values of n for which the graph $G'_z(Z_n)$ is Hamiltonian and as an example we show that how the results give as easy proof of the existence of a Hamilton cycle

21.MULTIPLICATIVE (GENERALIZED)-DERIVATIONS AND LEFT MULTIPLIERS IN SEMIPRIME RINGS by Ambreen Bano Department of Mathematics Aligarh Muslim University Aligarh, 202002, India
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The concept of multiplicative derivation was introduced by Daif (1997) and it was motivated by the work of Martindale (1969). According to Daif , the mapping $D : R \to R$ is said to be a multiplicative derivation if it satisfies $D(xy) = D(x)y+xD(y)$ for all $x, y \in R$. In the case of multiplicative derivations the mappings are not assumed to be additive. Further, Goldmann and Semrl (1996) gave the complete description of these mappings. Daif and Tammam El-Sayiad (1997) extended multiplicative derivations to multiplicative generalized derivations as follows: a mapping F on R is said to be multiplicative generalized derivation if there exists a derivation d on R such that $F(xy) = F(x)y + xd(y)$ for all $x, y \in R$. Recently, Dhara and Ali (2013) gave a more precise definition of multiplicative (generalized)-derivation as follows: a mapping $F : R \to R$ is said to be a multiplicative (generalized)-derivation if there exists a map g on R such that $F(xy) = F(x)y + xg(y)$ for all $x, y \in R$, where g is any mapping on R (not necessarily additive). Hence the concepts of multiplicative (generalized)-derivation covers the concepts of multiplicative derivation and multiplicative generalized derivation. A mapping $H : R \to R$ (not necessarily additive) is said to be a multiplicative left multiplier (centralizer) if $H(xy) = H(x)y$ holds for all $x, y \in R$. A multiplicative (generalized)- derivation associated with mapping $g = 0$covers the concept of multiplicative left multipliers.

It is more interesting to study the identities involving multiplicative (generalized)-1 derivation and a multiplicative left multiplier. In the Present paper, our main object is to investigate the cases when a multiplicative (generalized)- derivation F and a multiplicative left multiplier H satisfies the identities: $(i)F(xy) \pm H(x)H(y) = 0, (ii)F(xy) \pm H(y)H(x) = 0, (iii)F(xy) \pm H(yx) = 0, (iv)F[x, y] \pm H[x, y] = 0, (v)F(xy) \pm [H(x), y] \in Z(R), (vi)F(xy) \pm H(xy) \in Z(R)$ for all x, y in some appropriate subset of a semiprime ring R.

22.RAMANUJAN-TYPE CONGRUENCES MODULO POWERS OF 5 **AND** 7 by Ranganatha D Siddaganga Institute of Technology.
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Let $b_l(n)$ denote the number of l-regular partitions of n. In 2012, using the theory of modular forms, Furcy and Penniston presented several infinite families of congruences modulo 3 for some values of l. In particular, they showed that for $\alpha, n \geq 0, b_{25}(3^{2\alpha+3}n + 2.3^{2\alpha+2} - 1) \equiv 0(mod3)$. Most recently, congruences modulo powers of 5 for $C_5(n)$ was proved by Wang, where $c_N(n)$ counts the number of bipartitions (λ_1, λ_2) of n such that each part of λ_2 is divisible by N. In this paper, we prove some interesting Ramanujan-type congruences modulo powers of 5 for $b_{25}(n), B_{25}(n), c_{25}(n)$ and modulo powers of 7 for $c_{49}(n)$. For example, we prove that for $j \geq 1$,

$$c_{25}(5^{2j}n + \tfrac{11.5^{2j}+13}{12}) \equiv 0(mod5^{j+1}),$$
$$c_{49}(7^{2j}n + \tfrac{11.7^{2j}+25}{12}) \equiv 0(mod7^{j+1})$$

and

$$b_{25}(3^{2\alpha+3}.5^{2j-1}.n + 2.3^{2\alpha+2}.5^{2j-1} - 1) \equiv 0(mod3.5^{2j-1}).$$

23.SOME RESULTS ON VAGUE IDEAL OF AVAGUE NEAR- ALGEBRA by L.Bhaskar, P.Narasimhaswamy and T.Srinivas Department of Mathematics, Kakatiya University, Warangal, 506009,
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The main motivation of this paper to introduce the notion of vaguenear-algebra over a vague field and vague ideal. Based on these concepts, we analyzed some

properties and results for development of theorems illustrated with examples.

24.GENERALIZED (σ,τ)-DERIVATIONS IN SEMIPRIME RINGS by K. Subbarayudu, C. Jaya Subba Reddy, B. Ramoorthy Reddy Department of Mathematics, S.V.University, Tirupati, Andhra Pradesh, India
Let R be a semiprime ring, $F : R \to R$ be a generalized (σ,τ)-derivation associated with (σ,τ)-derivation d and $H : R \to R$ be a left σ-centralizer. If $(i)F(uv) \mp H(uv) = 0 (ii)F(uv) \mp H(vu) = 0; (iii)F(u)F(v) \mp H(uv) = 0;$ $(iv)F(uv) \mp H(uv) \in C_{\sigma,\tau}; (v)F(uv) \mp H(vu) \in C_{\sigma,\tau}; (vi)F(u)F(v) \mp H(uv) \in C_{\sigma,\tau}$ for all $u, v \in R$.

25.ON AVERAGE ORDER OF OSCILLATING MULTIPLICATIVE FUNCTIONS by Amandine Saldana and Ritika Sharma Harish-Chandra Research Institute, Allahabad, India
In this paper we generalized the method of Levin and Feinleib concerning average order of multiplicative functions and derive under suitable conditions an asymptotic formula with explicit error term for the sum $\sum_{n\leq N} f(N)$ where f is an oscillating multiplicative function which takes more positive values than negative

26.TERNARY SEMIGROUP SATISFIES THE IDENTITY $abc = ba$ by U. Nagi Reddy, K Rajani and G. Shobhalatha Dept. Of Mathematics, Rayalaseema University, Kurnool - 518002 Dept. Of Mathematics, Sri Krishnadevaraya University, Ananthapuramu 515003
The theory of ternary algebraic system was introduced by Lehmer in 1932, but earlier such structures were studied by Kasner who gave the idea of n-ary algebras. Ternary semigroups are universal algebras with one associative ternary operation. In 1955, J. Los studied some properties of ternary semigroups and proved that every ternary semigroup can be embedded in a semigroup. In this paper we consider the structure of ternary semigroups satisfying the identity $abc = ba$ for all a, b, c. In particular with this identity we verify that the commutative of the ternary semigroups.

SECTION C: REAL AND COMPLEX ANALYSIS (INCLUDING SPECIAL FUNCTONS, SUMMABILITY AND TRANSFORMS)

1.MULTI-INDEX DZRBASHJAN-GELFOND-LEONTIEV (D-G-L) OPERATORS AND FRACTIONAL q-DERIVATIVE by U. K. Saha, Cristina Gammeng, S. Maity Department of Basic and Applied Science National Institute of Technology Arunachal Pradesh, Yupia-791112, Itanagar, INDIA
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The multi-index Dzrbashjan-Gelfond-Leontiev $(D - G - L)$ differentiation and integration or simply $D - G - L$ operators, generated by multi-index Mittag-Leffler $(M - L)$ functions, play a pivotal role in the theory and applications of generalized fractional calculus. In this paper two theorems related to fractional q-derivative of $D - G - L$ operators has been derived. As a special case, we obtain fractional q-derivative of $D - G - L$ operators studied by Dimovski and Kiryakova.

2.q-DIFFERENCE EQUATIONS FOR THE COMPOSITE $2D$ q-APPELL POLYNOMIALS AND THEIR APPLICATIONS by Mumtaz Riyasat, Subuhi Khan and Tabinda Nahid Department of Basic and Applied Science Department of Mathematics, Faculty of Science, Aligarh Muslim University, Aligarh, India.
E-mail: tabindanahid@gmail.com
The main aim of this article is to introduce a new class of composite $2D$ q-Appell

polynomials and to study their properties. The generating function, series definition and some explicit relations for these polynomials are derived. These polynomials are studied from determi-nantal view point and their q-recurrence relations and q-difference equations are established.The composite $2D$ q-Bernoulli, q-Euler and q-Genocchi and composite q-Bernoulli-Euler, q-Bernoulli-Genocchi and q-Euler-Genocchi polynomials are studied as particular members of this class. Certain interesting examples are considered in terms of these members to give the applications of main results.

3.GENERALIZATION OF VALUE DISTRIBUTION AND UNIQUENESS OF CERTAIN TYPES OF DIFFERENCE POLYNOMIALS by Harina P. Waghamore Department of Mathematics, Jnanabharathi Campus, Bangalore University, Bangalore-560056, Karnataka.
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In this paper, we investigate the distribution of zeros as well as the uniqueness problems of certain type of differential polynomials sharing a small function with finite weight. The result obtained improves and generalizes the results of Pulak Sahoo, Biswajit Saha [21] and S.S.Bhoosnurmath and S.R.Kabbur[2].

4.TWO VARIABLE HYBRID FIBONACCI AND LUCAS POLYNOMIALS AND GOLDEN RATIO: AN INTERCONNECTIONS by R.Rangarajan and Honnegowda C. K Department of Studies in Mathematics University of Mysore, Manasagangotri, Mysuru - 570 006, INDIA.
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Interesting interconnections between Hybrid Fibonacci and Lucas polynomials in two variable and golden ratio are worked out in the present paper. Interconnections are due to close relationship existing between hybrid Lucas and Fibonacci polynomials and the four kinds of Tchebyshev polynomials. In this way, the present paper provides a better interconnecting combinatorial picture of the golden ratio as well as hybrid Fibonacci and Lucas polynomials.

5.UNIQUENESS OF MEROMORPHIC FUNCTIONS WITH REGARD TO MULTIPLICITY by NAVEENKUMAR S. H. Department of Mathematics, Jnanabharathi Campus, Bangalore University, Bangalore-560056, Karnataka.
E-mail: naveenkumarsh.220@gmail.com
In this paper, we investigate the uniqueness problem on mero-morphic functions concerning differential polynomials sharing one value. Our results will generalise and improve the result due to Chao. Meng [12].

6.UNIQUENESS PROBLEM OF q-SHIFT DIFFERENCE POLYNOMIALS SHARING A SMALL FUNCTION by Harina P. Waghamore and Rajeshwari S Department of Mathematics, Jnanabharathi Campus, Bangalore University,Bangalore-560056, Karnataka and Department of Mathematics, NMKRV College for Women, Bangalore-11, Karnataka.
E-mail: harinapw@gmail.com and rajeshwaripreetham@gmail.com
In this paper, we investigate the uniqueness problem of q-shift difference polynomials sharing a small functions. With the notion of weakly weighted sharing and relaxed weighted sharing we extend some well known previous results.

7.GROWTH PROPERTIES OF SOLUTIONS OF HIGHER ORDER COMPLEX LINEAR DIFFERENTIAL EQUATIONS WITH ENTIRE AND MEROMORPHIC COEFFICIENTS OF [p,q]-ORDER by Samten Tamang and Nityagopal Biswas Department of Mathematics, University of Kalyani.
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In the paper, we study the growth properties of entire and meromorphic solutions

of higher order complex linear differential equations with entire and meromorphic coefficients of $[p, q]$- order and we obtain some results which improve and extend some previous results due to J. Liu- J. Tu - L. Z Shi, L. M. Li - T. B. Cao and others.

8.UNIQUENESS PROBLEMS OF DIFFERENCE-DIFFERENTIAL POLYNOMIALS SHARING ONE VALUE OF ENTIRE FUNCTIONS by RAMYA MALIGI Department of Mathematics, Jnanabharathi Campus, Bangalore University, Bangalore-560056, Karnataka.
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In this paper, we study the uniqueness problems of difference-differential polynomials of entire functions f and g sharing one value with counting multiplicity (CM). The results extend and improve the results of Renukadevi S. Dyavanal and Ashwini M. Hattikal [3].

9.UNIQUENESS OF ENTIRE FUNCTIONS CONCERNING PRODUCT OF DIFFERENCE POLYNOMIALS by HUSNA V Department of Mathematics, Jnanabharathi Campus, Bangalore University, Bangalore-560 056, Karnataka.
E-mail: husnav43@gmail.com
In this paper, using the concept of weakly weighted sharing and relaxed weighted sharing we investigate the uniqueness of product of difference polynomials that share a small function. The results of the paper improve and extend the recent results due to Chao Meng [9].

10.AN IMPROVEMENT OF NEVANLINNAS FIVE VALUE THEOREM by DILIP CHANDRA PRAMANIK, JAYANTA ROY (SILIGURI) Department of Mathematics, University of North Bengal, West Bengal Department of Mathematics, University of North Bengal, West Bengal
E-mail: dcpramanik.nbu2012@gmail.com and dcpramanik.nbu2012@gmail.com
In this paper, we prove a uniqueness theorem for derivative of meromorphic functions which improves and generalizes some uniqueness theorems in connection to Nevanlinnas five value theorem.

11.ON A SUBCLASS OF HARMONIC UNIVALENT FUNCTIONS by R.B. SHARMA, B. RAVINDAR Department of Mathematics, Kakatiya University, Warangal, TS, India Department of Mathematics, S R Engineering College, Warangal, TS, India,
E-mail: rbsharma005@gmail.com and ravi.boini@gmail.com
In this paper, a subclass of harmonic univalent functions is defined by using a differential operator in the unit disk $U = \{z \in C : |z| < 1\}$ is studied. Some geometric properties like coefficient bounds, extreme points, convex combination and convolution conditions are studied for the functions in this class.

12.STABILITY PROPERTIES OF SECOND-ORDER SYNCHROSQUEEZING TRANSFORM by Ratikanta Behera Department of Mathematics and Statistics,Indian Institute of Science Education and Research Kolkata, Nadia,West Bengal, India, 741246.
E-mail: ratikanta@iiserkol.ac.in
We consider in this article the analysis of a variant of the second-order syn-chrosqueezing transform by taking into account the second derivative of the phase to deal with modes containing strong frequency modulation. Here we adapt the formulation of the short-time Fourier transform-based synchrosqueezing and show that second-order synchrosqueezing is robust to bounded perturbations of the signal. An important consequence of this technique is to deal with modes containing strong frequency modulation.

13.SECOND HANKEL DETERMINANTS FOR SOME SUBCLASSES OF BI-UNIVALENT FUNCTIONS SUBORDINATE TO BI-LINEAR TRANSFORMATION by Rayaprolu Bharavi Sharmaa, Kalikota Rajya Laxmib Department of Mathematics, Kakatiya University, Warangal, Telangana State, India, 506009, SR International Institute of Technology, Hyderabad, Telangana State, India, 501301,
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In this paper, we have investigated second Hankel determinants of bi-starlike, bi-convex and a bi-univalent function whose derivative has positive real part in the open unit disc Δ subordinate to a bi-linear transformation and different cases are also discussed.

14.ON λ-PSEUDO-STARLIKE FUNCTIONS IN A LEAF-LIKE DOMAIN by R.B.Sharma, M.Hari Priya and G.Murugusundaramoorthy Department of Mathematics, Kakatiya University, Warangal-506009, Telangana, India., Department of Mathematics, School of Advanced Sciences,VIT University ,Vellore-632014, Tamil Nadu, India, E-mail: rbsharma005@gmail.com, maroju.hari@gmail.com, gmsmoorthy@yahoo.com
he concept of leaf-like domains gained importance in the recent times. The concept of leaf-like domains was introduced by Sokol and Paprocki [?]. In the present investigation, we define two new subclasses of analytic functions denoted by $\pounds(q)$ and $\pounds_{(\lambda,g)}(q)$ and obtain the coefficient inequalities, Fekete-Szego inequality, second Hankel determinant for the functions in these classes. A similar study have been done for the function of f^{-1} and for the function $\frac{z}{f(z)}$.

15.COMMON FIXED POINT THEOREMS FOR GENERALIZED TAC CONTRACTION CONDITION IN B-METRIC SPACES by M.V.R. Kameswari and D.M.K. Kiran Department of Engineering Mathematics, GIT, GITAM University,Visakhapatnam-530045,Department of Engineering Mathematics,Vizag Institute of Technology,Visakhapatnam-531162,
E-mail: mvrkameswari@gmail.com
In this paper we obtain common fixed point theorems for our self maps using generalized TAC contractive condition in b-metric spaces. These results generalize the results of Abbas and Doric[2], Roshan, Shobkolaei, Sedghi and Abbas[20] and extends the results of Babu and Dula[9] to four mappings. To show validity of our results some illustrative examples are also furnished.

SECTION D: FUNCTIONAL ANALYSIS

1.GENERALIZATION OF NEW TYPE OF SEQUENCE SPACES by Rayees Ahmad, Syed Najamul Hasan School of sciences, department of mathematics, MANUU, Hyderabad-500032
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The space $r^q(u,p,s)$of non-absolute type have recently been introduced and studied (see,M.F.Rahman and A.B.M.R. Karim, Pure and Applied Math. Journal, $4(3),2015$). In the present paper we introduce the space $r^q(\triangle_u^p\ (s))$, we show its completeness property, prove that space $r^q(\triangle_u^p\ (s))$ and $l(p)$are linearly isomorphic and compute their kothe-duals. Furthermore we construct its basis and in our last section, we have characterised some matrix classes of infinite matrices.

2.SOME FIXED POINT THEOREMS ON NON-CONVEX SETS by M. Radhakrishnan, S. Rajesh and Sushama Agrawal Ramanujan Institute for Advanced Study in Mathematics,University of Madras,IIT Tirupati.
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Let K be a nonempty subset of a Banach space X. A mapping $T : K \to K$ is said to be nonexpansive if its Lipschitz constant is equal to 1. Kirk proved that the existence of fixed points for a nonexpansive map is guaranteed in the presence of a geometric property called normal structure.Note that every uniformly convex Banach space has normal structure. The convexity assumption cannot be dispense in the preceding result. In this direction, Veeramani introduced the notion of T-regular sets which need not be convex, and proved the existence of fixed points for a given nonexpanisve map T on a weakly compact T-regular set in a uniformly convex Banach space. Sullivan introduced the concept of k-uniform convexity $(k-UC)$ where $k\epsilon N$and proved that every k-uniformly convex Banach space has normal structure. Also, Sullivan observed that every $k-UC$ Banach space is a $(k+1)-UC$ and $1-UC$ is equivalent to uniformly convex Banach space. In this paper, we proved the existence of fixed points for a given nonexpansive map T on a weakly compact T-regular set in a $3-UC$ Banach space, which extends the result of Veeramani.

3.COUPLED COMMON FIXED POINT THEOREMS IN PARTIALLY ORDERED METRIC SPACES by Virendra Singh Chouhan, Richa Sharma Department of Mathematics and Statistics,Manipal University, Jaipur, India. Dept. of Applied Sciences, Rayat Bahra Institute of Engineering & Nano-Technology,Hoshiarpur, India.
E-mail: darbarvsingh@yahoo.com, richa.tuknait@yahoo.in
The object of this paper is to determine coupled common fixed point theorems in the framework of a metric space endowed with partial order. Our results generalize the main result of Bhaskar and Lakshmikantham [1] by using the new concept of mixed weakly monotone property. At the end we prove an example to support our result.

4.COMMON FIXED POINT THEOREMS FOR WEAKLY COMPATIBLE SELF-MAPPINGS IN KM AND GV FUZZY METRIC SPACES by N.Appa Rao, Dr. V.Dharmaih Dr.BRAOU, Hyderabad. Retd Professor, Osmania University, Hyderabad,
E-mail: apparaonemaala1968@gmail.com
In this paper we have proved some common fixed point theorems for weakly compatible Self-mappings in KM and GV-fuzzy metric Spaces.We have given an examples which satisfies validity of main theorem

5.A PARSEVALS EQUATION AND FINITE GENERALIZED HANKEL-TYPE TRANSFORMATION by V. R. Lakshmi Gorty SVKMs NMIMS, MPSTME, Vile Parle (W), Mumbai-400056(M.S.) India
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In this paper, the finite generalized Hankel-type transformation on spaces of generalized functions by developing a new procedure is studied. The two Hankel integral transformations $\hbar_{\alpha,\beta,\gamma,\mu}$ and $\hbar^*_{\alpha,\beta,\gamma,\mu}$connected by the Parsevals equation $\sum_{n=0}^{\infty}(\hbar_{\alpha,\beta,\gamma,\mu}f)(n)(\hbar^*_{\alpha,\beta,\gamma,\mu}\phi)(n) = \int_0^1 f(x)\phi(x)dx$ are considered. A Space $S_{\alpha,\beta,\gamma,\mu}$ of functions and a space $L_{\alpha,\beta,\gamma,\mu}$ of complex sequences are introduced. $\hbar^*_{\alpha,\beta,\gamma,\mu}$ is an isomorphism from $S_{\alpha,\beta,\gamma,\mu}$ onto $L_{\alpha,\beta,\gamma,\mu}$ when $\mu \geq \frac{-1}{2}$. The finite generalized Hankel transform $\hbar'_{\alpha,\beta,\gamma,\mu}f$ of $f \in S'_{\alpha,\beta,\gamma,\mu}, < (\hbar'_{\alpha,\beta,\gamma,\mu}f), (\hbar^*_{\alpha,\beta,\gamma,\mu}\phi)(n))_{n=0}^{\infty} >=< f, \phi >$, for $\phi \in S_{\alpha,\beta,\gamma,\mu}$ is proposed.

6.CERTAIN SUBSPACES OF THE SPACE OF ENTIRE FUNCTIONS OF BOUNDED TYPE AND COMPOSITION OPERATORS by Manjul Gupta and Deepika IIT Kanpur

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In this talk, corresponding to a comparison function γ which is an entire function defined on the complex plane, as $\gamma(z) = \sum_{n=0}^{\infty} \gamma_n z^n, \gamma_n > 0$ for each $n \in \mathbb{N}_0$ with $\gamma_n^{\frac{1}{n}} \to 0$ and $\frac{\gamma_{n+1}}{\gamma_n} \downarrow 0$ as n increases to ∞, we study the subspaces of the space $\mathcal{H}(E,F)$ defined as $\mathcal{H}_p^{\gamma}(E;F)=\{f \in \mathcal{H}(E;F) : \{\frac{||\frac{1}{m!}\hat{d}^m f(0)||}{\gamma_m}\} \in l_p\}, 1 \leq p \leq \infty$. The continuity of differentiation and translation operator has been proved by restricting γ suitably. Finally, the continuity and compactness of the composition operator C_ϕ, defined corresponding to a holomorphic function ϕ have been investigated.

7.WEIGHTED NORM INEQUALITIES INVOLVING VARIOUS CONVOLUTIONS by Sandhya Jain Department of Mathematics Vivekananda College (University of Delhi) Vivek Vihar, Delhi - 110095
In this presentation, we shall discuss generalized convolutions corresponding to certain well known convolutions. We shall discuss weighted norm inequalities involving these generalized convolutions in the framework of Lebesgue spaces and obtain necessary and sufficient conditions for these inequalities. The well-known Youngs inequality comes as a special case of one of the inequalities that we discuss

8.SOME RESULTS ON A SPECIAL TYPE OF OPERATOR NAMED λ- JECTION by Rajiv Kumar Mishra Department of Mathematics, Rajendra College, Chapra(Jai Prakash University,Chapra), Bihar- 841301
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In this article, λ- jection has been introduced which is a generalisation of trijection operator as introduced in P.Chandras Ph.D. thesis titled Investigation into the theory of operators and linear spaces (Patna University,1977). We obtain relation between ranges and null spaces of two given λ-jection under suitable conditions.

9.SOME FIXED-POINT THEOREMS FOR MAPPINGS SATISFYING INTEGRAL TYPE OF CONTRACTIVE CONDITION ON DISLOCATED QUASI B-METRIC SPACES by P.G. Golhare and C. T. Aage Department of Mathematics, Sant Dnyaneshwar Mahavidyalaya,Soegaon, Aurangabad, India, Department of Mathematics, North Maharashtra University, Jalgaon, India
E-mail: golhare@gmail.com, caage17@gmail.com
In view of fixed point results of A. Branciar, Zeqing Liu et.al. we have established fixed point theorems for integral contractive conditions in dislocated quasi b-metric spaces. We have extended some well known results in the setup of dislocated quasi b-metric spaces

10.COVARIANT REPRESENTATIONS OF SUBPRODUCT SYSTEMS: INVARIANT SUBSPACES AND CURVATURE by Jaydeb Sarkar, Harsh Trivedi and Shankar Veerabathiran Ramanujan Institute for Advanced Study in Mathematics, University of Madras and ISI Bangalore.
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Let $X = (X(n))_{n \in Z+}$be a standard subproduct system of C^*-correspondences over a C^*-algebra $\mathcal{M}$. Let $X = (T_n)_{n \in Z+}$ be a pure completely contractive, covariant representation of X on a Hilbert space $\mathcal{H}$. If S is a closed subspace of $\mathcal{H}$, then S is invariant for T if and only if there exist a Hilbert space D, a representation π of $\mathcal{M}$ on D, and a partial isometry $\prod : \mathcal{F}_X \bigotimes_\pi \to D \to H$such that $\prod(S_n(\zeta) \bigotimes I_{\mathcal{D}}) = T_n(\zeta)\Pi \ \zeta \in X(n), n \in Z_+$, and $S =$ ran Π, or equivalently, $P_S = \Pi \ \Pi^*$..This result leads us to a list of consequences including Beurling type

theorem and other general observations on wandering subspaces.We extend the notion of curvature for completely contractive, covariant representations and analyze it in terms of the above results.

SECTION E: DIFFERENTIAL EQUATIONS, INTEGRAL EQUATIONS AND FUNCTIONAL EQUATIONS

1.CLOSED FORM WAVE SOLUTIONS OF SHORMA-TASSO- OLVER EQUATION AND SECOND EXTENDED FIFTH ORDER NONLINEAR EQUATION by A. K. M. Kazi Sazzad Hossain, and M. Ali Akbar Department of Mathematics, Faculty of Science, Begum Rokeya University, Rangpur-5404, Bangladesh,Department of Mathematics, Faculty of Science, University of Rajshahi, Rajshahi-6205, Bangladesh.
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Nonlinear evolution equations ($NLEEs$) and their closed form wave solutions are very essential to understand the mystery of complex physical phenomena. The importance of closed form wave solution is increasing day by day. The enhanced (G'/G)-expansion method is highly effective and competent mathematical tool to examine closed form wave solutions of NLEEs arising in mathematical physics, applied mathematics and engineering. In this article, the enhanced (G'/G)-expansion method is suggested and executed to construct closed form wave solutions of the Shorma-Tasso- Olver equation and the second extended fifth order non-linear equation involving parameters. Each of the obtained solutions contains an explicit function of the variables in the considered equations. It has been shown that the method more effective tool for solving nonlinear wave equations in mathematical physics and engineering problems than other existing method.

2.CONVOLUTION IDENTITIES OF TWO VARIABLE TCHEBYSHEV POLYNOMIALS byC.K.Honnegowda and R.Rangarajan Department of Studies in Mathematics University of Mysore, Manasagangotri Mysuru - 570 006, INDIA.
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Two variable Tchebychev polynomials $T_n(x, y)$ and $U_n(x, y)$ are two interesting combinatorial entities given by 3 - term recurrence relations, binet forms and generating functions, which are quite different from those of Fibonacci and Lucas numbers. In recent literature many researchers are working convolution identities of L_n and F_n and similar entities. As a worthy addition to the current literature convolution identities of $T_n(x, y)$ and $U_n(x, y)$ are worked out in the present paper.

3.OSCILLATION OF THE CLASS OF SECOND ORDER DELAY, NONLINEAR, DEVIATED ARGUMENT AND INTEGRO FORCING TERM WITH VARIABLE COEFFICIENTS DYNAMIC EQUATION ON TIME SCALES by Shekhar singh negi, Syed Abbas and Muslim Malik Indian Institute of Technology, Mandi, H.P. - 175005
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In this article, we consider a second order delay, non-linear, deviated argument and integro forcing term with variable coefficients dynamic equation on time scales. By using Riccati technique which reduce higher order dynamic equation into lower order, to establish the sufficient conditions for oscillation.

4.REINFORCEMENT TO THE SECURITY FORCE IN A COUNTER INSURGENCY OPERATION UNDER DECAPITATION WARFARE DEALING WITH RANGE-DEPENDENT ATTRITION-RATE COEFFICIENTS by Lambodara Sahu Dept of Mathematics, Faculty of Civil Engineering, College of Military Engineering, Pune-411 031
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A confrontation among security force and insurgents under decapitation warfare may comprise undermining operation and ground combat. Considering the objective of the forces, the ground combat may be further subdivided into decapitation combat and regular combat. A counter insurgency operation by the security force may be considered as good as a regular combat with smaller strength involving undermining operations such as precision strike, missile attack, etc., against insurgents to nullify their various decapitation strategies like assassination or abduction of key Govt. officials, ministers and high profile politicians in addition to other undermining operation like mining roads and bushes used by security force.

Maximum effective range, undermining operation and robustness play a vital role for a force to achieve its better effectiveness in the combat. However, sometimes in a counter insurgency operation, the insurgents outnumber the security force due to the frequent change in strategies of insurgents. Therefore, reinforcement to the security force is significant to minimise casualty and to finish that operation within a stipulated time frame.

In this paper, using the concepts of Lanchester-type equations and incorporating certain operational factors like range-dependent attrition-rate coefficients, robustness, undermining effects, break-points, a conceptual model is being developed to project the effectiveness of forces while showing the importance of reinforcement and its strength to the security force at an early stage of combat operation by considering a case study.

5.STABILITY AND BIFURCATION ANALYSIS OF A CLASS OF FRACTIONAL-ORDER DELAYED LOGISTIC MODEL by Swati Tyagi, Syed Abbas and S.C. Martha Department of Mathematics, Indian Institute of Technology, Ropar Punjab, 140001, India, School of Basic Sciences, Indian Institute of Technology, Mandi H.P., 175001, India

In this paper, we introduce a discretization process to discretize fractional-order delayed logistic model. We study stability of the fixed points of the resultant dynamical system and obtain sufficient conditions ensuring the existence, uniqueness, and stability of the equilibrium point. Furthermore, we analyze the associated characteristic transcendental equation to show the presence of Hopf bifurcation at the positive equilibrium for single as well as two delay cases. We investigate the complex dynamical behaviours of such model system by means of numerical simulations. At the end, we present simulation results to illustrate the theoretical findings and to show potential routes towards the onset of chaotic behaviour with respect to the change in the fractional order of the system

6.FIXED POINT THEORY AND FOOD PRODUCTION PROBLEMS by B.D.Karande and S.P.Shinde Department of Mathematics, Maharashtra Udayagiri Mahavidyalaya, Udgir-413517, Maharashtra, India, Department of Mathematics, Vasantrao Naik Mahavidyalaya, Nanded-431605, Maharashtra, India.

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Most of the natural and physical phenomena in the universe are not straight forward, since there is nonlinear nature of phenomenon in the area of Sciences are not continuous and involve jumps or discontinuous. Such as effect of discontinuous or jumps of environment and heat stress on the agricultural food production, body growth, milk production, semen production, female reproduction of animals also plant characters.Again, almost all such natural and physical phenomena involve the decay or growth, that is, the change in the state with respect to the time period. Increase in temperature and carbon dioxide can increase or decrease crop yields in some places. The effects of climate change also need to be considered

along with other evolving factors that effects agricultural food production. Agriculture is an important sector of the Indian economy. Agriculture and fisheries are highly dependent on the climate. Therefore some of these types of problems may be formulated as nonlinear differential and integral equations involving discontinuous terms. Nonlinear differential and integral equations of arbitrary order play an important role in branch of nonlinear analysis and their applications in biological Sciences. In this paper, we prove the existence the solution for such type of nonlinear integro-differential equation and its applications. From the present investigation it is concluded that the fixed point method which is powerful tool for existence the solution of such type nonlinear integro-differential equations in Banach Spaces.

7.MONOTONE METHOD FOR A NEUTRAL DIFFERENTIAL EQUATION by Mamta Kumari Shree Damodar College of Commerce and Economics, Comba, Margao, Salcete, Goa 403601, INDIA.
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In this paper we show that there exist a solution of the periodic boundary value problem of the type: $x'(t) = f(t, x(t), x([t])), x'([t]); x(0) = x(T) \forall t \in J$
where $J = [0, T]$,$f \in C(JXR^3, R)$ and [.] denotes the greatest integer function

8.COMPARISON OF PROPER REGULAR SPLITTINGS by Debasisha Mishra Department of Mathematics, National Institute of Technology Raipur, Raipur-492010, India.
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Theory of matrix splittings is a useful tool in the analysis of iterative methods for solving systems of linear equations. When two matrix splittings are given, it is of interest to compare the spectral radii of the corresponding iteration matrices. This helps to arrive at the conclusion that which splitting should one choose so that one can reach the desired solution of accuracy or the exact solution in a faster way. In this context, we first study convergence of proper regular splitting and then provide a few comparison results.

9.GLOBAL EXISTENCE OF SOLUTIONS FOR NONLINEAR FUNCTIONAL DIFFERENTIAL EQUATION by Dr. Haribhau Laxman Tidke Department of Mathematics, North Maharashtra University, Jalgaon-425001 (MS).
Email: tharibhau@gmail.com
We prove the global existence of solutions of nonlinear functional differential equation in a Banach space. The technique used in our analysis is based on an application of the topological transversality theorem known as Leray-Schauder alternative and rely on a priori bounds of solutions.

10.EXACT SOLUTION OF GENERALIZED RIEMANN PROBLEM FOR R-TYPE MATERIA by Sueet Millon Sahoo, T. Raja Sekhar, G.P. Raja Sekhar Indian Institute of Technology Kharagpur,
Email: sweetruight6@gmail.com, rajas@maths.iitkgp.ernet.in
This Paper is devoted to obtain an exact solution to generalized Riemann problem for nonhomogeneous quasilinear hyperbolic system of partial differential equations (PDEs) describing rate type material. We derive consistency conditions and constraint equations for the governing equations with the help of differential constraint method. Finally, we characterize the solution for an arbitrary function as initial data which will help us to find exact solution for generalized Riemann problem

11.EXISTENCE RESULTS ON NATURAL FUNCTIONAL STOCHASTIC DIFFERENTIAL EQUATIONS WITH VARIABLE DELAYS AND POISSON JUMPS by K.Banupriya and A.Anguraj PSG College of Arts and Science, Coimbatore-641014, Tamil Nadu, India.

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In this article, we investigated the existence and uniqueness result for a neutral functional stochastic differential equations with variable delays driven by both cylindrical Brownian motion and by the Poisson point processes in a Hilbert space with non-Lipschitzian coefficients

SECTION F: GEOMETRY

1.KAEHLERIAN SPACES ADMITTING IN H-PROJECTIVE VECTOR FIELD WITH CONSTANT SCALAR CURVATURE by U.S. NEGI
H.N.B. Garhwal (A Central) University, S.R.T. Campus Badshahi-Thaul, Tehri Garhwal - 249199, (U.K.), India.
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Ishihara (1959) has studied holomorphically projective changes and their groups in an almost complex manifold and also proved on holomorphic planes. Obata (1965) has defined and studied Riemannian manifolds admitting a solution of a certain system of differential equations. In this paper, we have defined and studied Kaehlerian spaces admitting in H-projective vector field with constant scalar curvature and several theorems have been proved. Also, then find necessary and sufficient conditions for such a Kaehlerian space to be isometric to a complex projective space with Fubini-Study metric.

2.HOLOMORPHIC ASPECTS OF MODULI OF REPRESENTATIONS OF QUIVERS by Pradeep Das , S. Manikandan, and N. Raghavendra Harish-Chandra Research Institute, Allahabad, India.
Email: smanikandan@hri.res.in , manimaths87@gmail.com
This article describes some complex-analytic aspects of the moduli space of the finite-dimensional complex representations of a finite quiver, which are stable with respect to a fixed rational weight. We construct a natural structure of a complex manifold on this moduli space, and a K ahler metric on the complex manifold. We then define a Hermitian holomorphic line bundle on the moduli space, and show that its curvature is a rational multiple of the K ahler form.

3.D-HOMOTHETICALLY DEFORMED KENMOTSU METRIC AS A RICCI SOLITON by KIRAN KUMAR D L DEPARTMENT OF MATHEMATICS, BANGALORE UNIVERSITY, JNANABHARATHI CAMPUS, BANGALORE-560056, INDIA
Email: kirankumar250791@gmail.com
In this paper we study Ricci solitons in D-homothetically deformed Kenmotsu manifolds. We prove that η-Einstein Kenmotsu metric as a Ricci soliton remains η-Einstein under D-homothetic deformation and the scalar curvature remains constant

4.ASYMPTOTICALLY REGULAR SELF MAP IN METRIC SPACES by Dr. Capt. K.Sujatha and Mr. B. Ramu Naidu Selection Grade Lecturer and Head, Department of Mathematics & Statistics, St. Josephs College for Women (Autonomous), Visakhapatnam-530 004, India, Faculty in Mathematics, A U Campus, Vizianagaram 535003
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Banach fixed point theorem and its applications are well known. Many authors have extended this theorem, introducing more general contractive conditions, which imply the existence of a fixed point. Almost all of conditions imply the asymptotic regularity of the mappings under consideration. So the investigation of the asymptotically regular maps plays an important role in fixed point theory. Sharma& Yuel

and Guay & Singh were among the first who used the concept of asymptotic regularity to prove fixed point theorems for a wider class of mappings than a class of mappings introduced and studied by Ciric On the other hand as long back Browder and Petryshgn defined the asymptotically regular maps in metric space. In this paper we prove a fixed point theorem in a metric space, without using continuity. Incidentally we observe that the result of K. Prudhvi is not valid for Cone Metric Spaces. We also observe that it is valid for metric spaces and follows from our result

5.HOPF REAL HYPERSURFACE IN COMPLEX SPACE FORM by UPPARA MANJULAMMA Department of Mathematics, Jnanabharathi Campus, Bangalore University, Bangalore-560056, Karnataka.
Email: umanjula1@gmail.com
The object of the present paper is to study Hopf real hypersurface in complex space form. We gave a characterization of projective and hyperbolic complex space form based on curvature conditions of real hypersurface of complex space.

6.ON PARA-KENMOTSU MANIFOLDS ADMITTING W2 CURVATURE TENSOR by K.L.Sai Prasad and S.Sunitha Devi Department of Mathematics, Gayatri Vidya Parishad College of Engineering for Women Madhurawada, Visakhapatnam, 530 048, INDIA Department of Mathematics,Vignan Institute of Information Technology Visakhapatnam, 530 049, INDIA
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The object of the present paper is to study the properties of a para-Kenmotsu manifold admitting W_2-curvature tensor. It is shown that a W_2-semisymmetric para-Kenmotsu manifold is of constant curvature and hence it is an SP-Kenmotsu manifold. Further, it is shown that a W_2-recurrent manifold is W_2-semisymmetric and hence a W_2-recurrent para-Kenmotsu manifold is an SP-Kenmotsu manifold. Finally,it is proved that an n-dimensional $(n > 2)$ P-Kenmotsu manifold is Ricci semisymmetric if and only if it is an Einstein manifold

SECTION G: TOPOLOGY

1.R_0CONCEPTS IN FUZZY BITOPOLOGICAL SPACES by Md. Ruhul Amin, Md. Sahadot Hossain Department of Mathematics, Faculty of Science, Begum Rokeya University, Rangpur, Rangpur-5404, Bangladesh Department of Mathematics, Faculty of Science, University of Rajshahi, Rajshahi-6205, Bangladesh.
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In this paper, we introduce four notions of R_0-property in fuzzy bitopological spaces by using quasi-coincident sense. We show that all these notions satisfy good extension property. Also hereditary and productive properties are satisfied by these concepts. We observe that all these concepts are preserved under one-one, onto and continuous mappings. Finally, we show that initial and final fuzzy bitopological spaces are R_0.

2.FUZZY T_2 TOPOLOGICAL SPACE IN QUASI-COINCIDENCE SENSE by Saikh Shahjahan Miah, M. R. Amin and Sohel Rana Faculty of Science & Engineering, Pundra University of Science & Technology, Rangpur Road, Gokul, Bogra-5800, Bangladesh Department of Mathematics, Faculty of Science, Begum Rokeya University, Rangpur-5404, Bangladesh
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In this paper, we introduce two notions of T_2 property in fuzzy topological spaces by using quasi-coincidence sense and we establish relationship among our and other such notions. We also show that all these notions satisfy good extension property. Also hereditary, productive and projective properties are satisfied by these notions.

We observe that all these concepts are preserved under one-one, onto, fuzzy open and fuzzy continuous mappings. Finally, we discuss initial and final fuzzy topologies on our second notion.

3.REGULAR FUZZY TOPOLOGICAL SPACE IN QUASI-COINCIDENCE SENSE by M. R. Amin, SaikhShahjahan Miah, Alamgir Kabir and Sohel Rana Department of Mathematics, Faculty of Science, Begum Rokeya University, Rangpur, Rangpur-5404, Bangladesh Faculty of Science & Engineering, Pundra University of Science & Technology, Rangpur Road, Gokul, Bogra-5800, Bangladesh
Email: akmath10.11@gmail.com
In this paper, we introduce two notions of regular property in fuzzy topological spaces by using quasi-coincidence sense and we establish relationship among them. We also show that all these notations satisfy hereditary property. We observe that all these concepts are preserved under one-one, onto, fuzzy open, fuzzy closed and fuzzy continuous mappings

4.SOFT ALMOST B-CONTINUOUS MAPPINGS by Samajh Singh Thakur and Alpa Singh Rajput Department of Applied Mathematics, Jabalpur Engineering College Jabalpur (M. P.) 482011 India.Department of Applied Mathematics, Jabalpur Engineering College Jabalpur (M. P.) 482011 India.
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In the present paper,we introduce one class of soft mappings,namely soft almost b-continuous mappings and investigate several properties of these mappings.This notion is stronger than soft almost β-continuous mappings and is weaker than both soft almost pre-continuous mappings and soft almost semi-continuous mappings.The diagrams of implications among these soft classes of mappings and some known classes of mappings have been established.

5. FUZZY REGULAR Z- OPEN SETS by P.Xavier Department of Mathematics, Karunya university, Coimbatore-641114, Tamilanadu, India.
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In fuzzy topological space, the relationship between open sets and closed sets is established using the standard complement $\zeta(x) = 1 - x$. The concept of arbitrary complement function in fuzzy literature generalizes the concepts of fuzzy topological spaces. The notion of fuzzy regular ζ-closed sets are introduced using the arbitrary complement function $\zeta : [0, 1] \to [0, 1]$ and their properties are studied.

SECTION I: NUMERICAL ANALYSIS, APPROXIMATION THEORY AND COMPUTER SCIENCE

1.MULTI-TASK LEARNING VIA LINEAR FUNCTIONAL STRATEGY by Abhishake Rastogi and Sivananthan Sampath Department of Mathematics, Indian Institute of Technology Delhi New Delhi 110016, India
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In machine learning, the multi-task learning is a natural approach that exploits the relations among different tasks to improve the performance. We develop a theoretical analysis of multi-penalty least-square regularization scheme on the reproducing kernel Hilbert space in vector-valued setting. The results hold for general framework of vector-valued functions; therefore they can be applied to multi-task learning problems. We study an approach for multi-penalty regularization scheme which is based on the idea of linear combination of different regularized solutions. We estimate the coefficients of the linear combination by means of the so-called linear functional strategy. We discuss a theoretical justification of the linear functional strategy which particularly provides the optimal convergence rates for multi-penalty regularization scheme. Finally, we provide an empirical analysis of the multi-view

manifold regularization scheme based on the linear functional strategy for the challenging multi-class image classification and species recognition with attributes.

SECTION J: OPERATIONS RESEARCH

1.A Fuzzy based Inventory Model with Weibull Deterioration rate, Exponential Demand, allowable Shortages under Partial Backlogging and Time Dependent Holding Cost by Sahidul Islam and Abhishek Kanti Biswas Department of Mathematics, University of Kalyani, Nadia, West Bengal, India. Department of Mathematics, R. K. M. Vivekananda Centenary College, Kolkata, W. B., India.
Email : a.k.biswas@hotmail.com
In this study, a fuzzy based deterministic Economic Order Quantity Inventory Model for Weibull Distribution deterioration, exponential demand rate with time dependent holding cost and allowable Shortages under Partial Backlogging condition in crisp and fuzzy environment is formulated and solved. The cost components, demand and deterioration rate are assumed as a Trapezoidal Fuzzy Numbers and Graded Mean Integration Representation Method is used to defuzzify the model. The purpose of this paper is to maximizing the total average profit by finding the optimal time interval in different environment. A numerical example is given to demonstrate the optimal decision for the retailer. Finally sensitivity analysis is also given to show that the total cost function is extremely influence by the variation of the costs and other parameters

2.TRANSPORTATION MODEL THROUGH GOAL PROGRAMMING MODEL by C. ASHOK KUMAR HOD, Dept. of Mathematics, University P.G. Centre, Kollapur, Palamuru University, Nagarkurnool (Dist), Telangana state - India.
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In this paper, the model is developed to demonstrate how the prioritized goal programming can be used in solving the process of a transportation problem. A leading oil company in India has been taken here for the testing of model. This paper will examine the test results

SECTION K: SOLID MECHANICS, FLUID MECHANICS GEOPHYSICS AND RELATIVITY

1.DYNAMICS OF BIANCHI TYPE- II UNIVERSE WITH ANISOTROPIC DARK ENERGY IN LYRA GEOMETRY by R K Dubey , Neelam Yadav Department of mathematics, Govt Model Science College,Rewa(M.P.) India, Department of mathematics, Govt PG College, Magaraha Mirzapur (UP)
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In this paper, we have studied the totally anisotropic Bianchi type II universe filled with an anisotropic dark energy within the framework of Lyra geometry. The Einstein's field equations have been solved by applying hybrid expansion law for the average scale factor of the model. It is shown that the universe is early decelerating and late-time accelerating one. The universe is anisotropic throughout its evolution. We have discussed the kinematical and physical behaviors of the model. We have observed that the universe expands forever due to the dominance of dark energy.

2.RAYLEIGH WAVES IN AN INCOMPRESSIBLE NON-LOCAL ELASTIC MEDIUM UNDER GRAVITY EFFECT by B. Chandulal Department of Mathematics, R.S.Vidyapeetha, Tirupati, A.P.
Email: chandulal2009@gmail.com

In this paper, the problem of Rayleigh waves in an incompressible non-local elastic solid under gravity effect is studied. The velocity equation is derived and it is compared with the corresponding equation of the lattice dynamics to seek the variation between reduced frequency and the reduced wave number. This variation is presented graphically and it is observed that frequency is an increasing function of wave number and it decrease for an increase of gravity

3.HASHIN-SHTRIKMAN BOUNDS OF THERMAL BOUNDARY LAYERS IN UNSTEADY STAGNATION POINT FLOW OVER A STRETCHING SURFACE by P.Gayathri and N.Nithyadevi Demartment of Mathematics, Bharathiar University, Coimbatore, India.
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The objective of this study is in implementing the Maxwell upper bound model for predicting effective thermal conductivity of nanofluids in boundary layer flow. An analysis is carried out to study the thermal boundary layers of the stagnation point flow over a stretching surface for two bounds of Maxwell called Hashin-Shtrikman (HS) bounds. The governing equations are reduced to similarity equations and solved by fifth order Runge-Kutta Fehlberg Method coupled with shooting technique. A unique solution is obtained for forward flows dual solution are found to exist for backward flows where one of the solutions are stable and the other one is unstable. Numerical investigation is performed for two classical bounds of thermal conductivities, the lower corresponding to series mode configuration and the upper corresponding to parallel mode configuration of nanoparticles. The results is indicate that the lower bound depends on particle volume fraction and the upper bound depends both on particle volume fraction and thermal conductivity of nanoparticle. The heat transmission rate is higher for the upper bound due to the particle interaction constituting chain forming morphology of nanoparticles. A comparative analysis of the solution of the forward and backward flows (stable solutions) is also made.

4.SLIP EFFECTS ON MHD FREE CONVECTIVE FLOW OF A FLUID THROUGH POROUS MEDIUM IN AN INCLINED CHANNEL by K. Madhusudhana and K.Ramakrishna Prasad Department of Mathematics, S.V.University, Tirupati 517 502, A.P., India
Email: k.madhusudhan13@gmail.com
In this paper, we investigated the MHD free convective flow of a Newtonian fluid through a porous medium in an inclined channel by considering the slip effect. The expressions for the velocity and temperature are obtained analytically. The effects of various physical parameters on the velocity and temperature are discussed in detail.

5.EFFECT OF CONVECTIVE BOUNDARY CONDITION AND JOUL HEATING ON PERISTALTIC TRANSPORT OF JEFFREY FLUID IN AN ASYMMETRIC CHANNEL by N.L.Bhikshu, Y.V.K.Ravi Kumar, M.V.Ramana Murthy and S. Sreenadh Department of Mathematics, Kesava Memorial Institute of Technology, Narayaguda, Hyderabad 500007 Practice School Division, Birla Institute of Technology & Science-Pilani, Hyderabad, India Department of Mathematics and Computer Science, Osmania University, Hyderabad 500007 Department of Mathematics, Sri Venkateswara University, Tirupati 517502
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This paper deals with peristaltic flow of a Jeffrey fluid in an asymmetric channel in the presence of the convective boundary condition and Joul heating. Long wave length and low Reynolds number approximations are employed. The channel asymmetry is caused due to the peristaltic wave train on the walls having different

amplitudes and phase. Analytical solution for stream function and temperature are constructed. Numerical investigation is carried out for pressure raise per wave length. The effects of various emerging parameters on the flow characteristics are shown and discussed with the help of graphs. It is noticed that pressure gradient decreases with increase in Hartmann number and the effects of Biot number is dominant near the walls of the channel.

6.STUDY OF COUETTE FLOW THROUGH DEFORMABLE POROUS MEDIA SANDWICHED BETWEEN TWO PARALLEL PLATES by Prakash Kumar and G.P.Raja Sekhar Department of Mathematics, Indian Institute of Technology, Kharagpur 721302, India
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Hydrodynamics of the flow through deformable porous medium Sandwiched between two parallel plates is discussed where the flow is governed by the pressure gradient and the flux velocity of the upper plate. The governing equations of the fluid velocity and the solid displacement are based on the biphasic mixture theory. The solid matrix of the deformable porous medium is strictly attached to the lower plate so that it does not displace from its place. However, the solid matrix of porous medium assumed to move freely to the upper plate, through, the upper plate movement influences the solid displacement. Moreover, the fluid layer at the lower plate experiences the slip velocity due to the roughness of the solid surface. Unidirectional flow of the fluid and solid deformation has been studied for the study and unsteady state. For the unsteady case, the upper plate is assumed to be oscillating with a particular velocity due to which the flow inside the whole channel is assumed to be oscillatory along with the pressure. More details of the flow and solid deformation have been discussed with different non dimensional parameters describing the physical properties of solid and fluid. Effect of porosity, permeability, oscillatory parameter and the slip coefficient on the fluid velocity and solid matrix deformation has been studied.

7.A BOUNDARY INTEGRAL EQUATION METHOD FOR THREE-DIMENSIONAL BRINKMEN FLOWS IN THE TERM OF NON-PRIMITIVE VARIABLES. byChandra Sekhar Nishad and G.P.Raja Sekhar Department of Mathematics, Indian Institute of Technology, Kharagpur 721302, India
Email: rjs@iitkgp.ac.in
In this study, we present a boundary integral equation method to solve three-dimensional Brinkmen flows using Hellmholtz decomposition based on non-premitive variables, namely a scalar potential, a vector potential and the vorticity vector. There are mainly two approaches to solve Brinkmen equation using boundary integral methods, first in terms of primitive variables, namely velocity and traction (also known as Brinkmenlet formulation) and the second in terms of non-premitive variables namely stream function-vorticity variables (in case of two dimensional or three-dimensional axisymmetric flows). Boundary integral formulation for Brinkmen flows in terms of primitive variable are well known and available in the literature. As per the knowledge of the authors, there does not exit any boundary integral formulation for two-and three-dimensional Brinkmen flows in terms of non primitive variables. Therefore, in this work we propose a boundary integral equation method to solve three-dimensional Brinkmen flows in terms of non-premitive variables

8.EXISTENCE AND UNIQUENESS RESULT FOR FLUID FLOW INSIDE A DEFORMABLE SOLID TUMOR by Meraj Alam, Bibaswan Dey, G.P.Raja Sekhar Department of Mathematics, Indian Institute of Technology, Kharagpur 721302, India

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In this work, we present a biphasic mixture theory based mathematical model for the hydrodynamics of interstitial fluid motion and solid phase deformation inside a solid tumor. The tumor tissue considered here is an isolated viscoelastic biological medium. The solid phase of the tumor is constituted by vasculature, tumor cells, and extracellular matrix, which is wet by a physiological extracellular fluid. The intravascular fluid or blood and the interstitial fluid formed a single fluid phase. Since the tumor is deformable in nature, the mass and momentum balance equations for both the phases are presented. The momentum equations are coupled due to interaction (or drag) force term. The wall posedness of this model is shown in the weak sense under following assumptions (i) motion of interstitial fluid flow and solid phase deformation are slow and (ii) neutrient proliferation rate is must faster than the tumor cell growth. We use semi-dicsrite Galarkin method to establish the wall posedness. Further, we discussed some numerical results in the case of one dimensional radial symmetry.

9.EFGM SOLUTIONS OF NATURAL CONVECTIVE VISCOUS JEFFREY FLUID FLOW PAST A VERTICALLY INCLINED PLATE IN PRESENCE OF TRANSVERSE MAGNETIC FIELD, POROUS MEDIUM, HEAT AND MASS TRANSFER EFFECTS by G. Aruna and R. Srinivasa Raju Department of Mathematics, GITAM University, Hyderabad Campus, Rudraram, Medak (Dt), 502329, Telangana State, India
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In this contribution, the influence of Jeffrey fluid on natural convective boundary layer flow of a incompressible, electrically conducting and viscous fluid along a vertical inclined moving plate in the presence of a uniform transverse magnetic field, porous medium, heat and mass transfer effects is studied. For this investigation, we assume the plate is moving with a constant velocity in the direction of fluid flow while the free stream velocity is assumed to follow the exponentially increasing and time dependent wall suction which occur at the permeable surface. The original dimensionless governing non-linear partial differential equations for this investigation are solved numerically using the element free Galerkin method. By using the element free Galerkin method, a solution is obtained which is in a good agreement with the momentum, energy and concentration equations. Numerical results for the velocity, temperature and concentration distributions are obtained. In addition to the skin friction, local Nusselt numbers and Sherwood number are analyzed. Angle of inclination and Jeffrey fluid sustains a retarding effect on velocity. Limiting case results are obtained for the non-Newtonian fluid and compared with the literature. The present study has an immediate applications in understanding the drag experienced at the heated/ cooled and inclined surface in a seepage flow.

10.EFFECT OF SURFACE ROUGHNESS AND NON-NEWTONIAN MICROPOLAR FLUID SQUEEZE FILM BETWEEN CONICAL BEARINGS by P.S.Rao, Birendra Murmu and Santhosh Agarwal Department of Applied of Mathematics, IIT (ISM), Dhanbad 826004, India.
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Base on the Micropolar fluid model of Eringens and Christensens stochastic theory, the analysis of effects of surface roughness and the squeeze film lubrication problems between conical bearings are presented. The concern non dimensional equations is solved with appropriate boundary condition in dimensionless from to get the pressure distribution, which is then used to obtain the expression for load carrying capacity, paving the wave for the calculation of response time. Computed values of pressure, load capacity and response time are displayed in graphical form.

This investigation reveals that the bearings admits and improved the performance as compared to that of a bearing system working with a conventional lubricant. According to the results, the effect of transverse roughness provide an increasing in the bearing characteristics as compared to the smooth bearing lubricated with Micropolar fluid and whereas the influence of longitudinal roughness yield a revised trend. The quantifiable effects of rough surface and non-Newtonian fluids on bearing performance of more pronounced for the roughness parameter and Micropolar parameter.

11.CENTER MANIFOLD THEORY FOR REDUCTION OF THREE-MODE LORENZ MODEL TO A QUINTIC GINZBURG-LANDAU EQUATION IN RAYLEIGH-BENARD CONVECTION IN ENCLOSURES by
Sushma T.S C.N.M. Institute of Technology
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Center manifold theory, the reduction tool in reducing the dimension of the dynamical system is used in the present paper. The three-mode Lorenz model is scaled down to a quintic Ginzburg-Landau model.

12.RIEMANN PROBLEM AND WAVE INTERACTIONS IN ONE DIMENSIONAL BLOOD FLOWS by
T. Raja Sekhar Indian Institute of Technology, Kharagpur, Kharagpur 721302, India
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In this talk, we consider the Riemann problem and interaction of elementary waves for the quasilinear hyperbolic system of conservation laws that arises in blood flow through arteries. We discuss the properties of solution involving shocks and rarefaction waves and establish the existence and uniqueness conditions. Further, we show that the Riemann problem is solvable for arbitrary initial data under certain condition and construct the condition for no-feasible solution. Finally, we discuss the interactions of elementary waves of same family as well as from different family.

13.EFFECTS OF THERMAL RADIATION AND CHEMICAL REACTION ON AN UNSTEADY MHD FLOW OF A JEFFREY FLUID PAST A VERTICAL POROUS PLATE WITH SUCTION M. Eswara Rao, S. Sreenadh and B. Sumalatha Department of Mathematics, Sri Venkateswara University, Tirupati 517 502, A.P. Email: profsreenadh@gmail.com
An unsteady flow of an incompressible Jeffrey fluid past a semi infinite vertical plate with time dependent suction is examined. The dimensionless governing equations are solved by employing perturbation technique. The expressions for the velocity, temperature and concentration are obtained. Numerical results for velocity, temperature, concentration, Skin friction, Nusselt number, Sherwood number are shown in various graphs and discussed for embedded flow parameters. It is observed that the velocity increases due to increase in the Jeffrey parameter λ_1 and Eckert number. Further increase in the Prandtl number leads to decrease in the temperature field.

14.CONVECTION IN A HEAT GENERATING POROUS CAVITY WITH THERMAL NONEQUILIBRIUM by
R.K. Brinda and S. Saravanan Department of mathematics, Bharathiar University, Coimbatore, Tamil Nadu, India.
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Natural convection in a porous medium has been studied extensively over the past two decades due to its numerous applications in geophysical systems and chemical engineering industry such as post accident heat removal (PAHR), solidification of castings study of heat transfer phenomenon of buried electrical cables and

transformer cables, fluidized bed combustion and thermochemical energy storage systems. The overwhelming majority of existing studies pertinent to the phenomena of heat and fluid flow through porous media makes use of the Darcy flow model. The model, however, is valid only for slow flows through porous media with low permeability (see Nakayama et al., 1990). At higher flow rates or in highly porous media there is a departure from the linear law and inertial effects become important. Baytas and Pop (2002) studied free convection in a differentially heated square cavity using a thermal noneuilibrium model. Pippal (2013) studied the influence of local thermal noneuilibrium state on natural convective flow in an enclosure filled with a fluid saturated porous medium. The aim of the present work is to study the influence of heat generation on natural convection flow in a square cavity filled with a fluid-saturated porous medium with isothermal horizontal walls and adiabatic vertical walls by considering Darcy-Brinkman-Forchheimer model and by adopting a two temperature model of heat transfer. The governing equations are solved using the finite volume technique with staggered grid formulation. To treat the pressure-velocity coupling, SIMPLE algorithm is used. The study was performed for different values of Rayleigh number ranging from 10^5 to 10^8. The numerical results for streamlines, isotherms and average Nusselt numbers are presented graphically. The influence of the non-dimensional parameters such as heat transfer coefficient H and fluid-to-solid conductivity ratio on the resulting heat transfer characteristic are presented. It is noticed that for large values of the above parameters results pertaining to thermal equilibrium case are recovered

15.PERISTALTIC FLOW OF A PRANDTL FLUID BETWEEN POROUS WALLS IN AN INCLINED CHANNEL WITH SUCTION AND INJECTION P. Hariprabakaran, R. Saravana, R. Hemadri Reddy and S. Sreenadh Department of Mathematics, Thiruvalluvar University, College of Arts and Science, Gajalnaickanpatti, Tirupattur 635901, Tamilnadu, India. Department of Mathematics, Madanapalli Institute of Technology and Science, Madanapalli 517325, A.P., India. Department of Mathematics, SAS, VIT University, Vellore 632014, Tamilnadu, India. Department of Mathematics, S.V.University, Tirupati 517502, A.P., India.
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The peristaltic transport of Prandtl fluid past porous walls in an inclined channel with suction and injection is investigated. A regular perturbation technique has been employed to determine the expressions for the pressure raise and friction force per wave length under the assumptions of long wave length and low Reynolds number. The effects of different on the pumping characteristics per wave length are discussed graphically. It is found that the larger the angle of inclination, the greater the pressure raise against the pump works

16.MAGNETOHYDRODYNAMIC BOUNDARY LAYER FLOW OF A NANOFLUID THROUGH POROUS MEDIUM OVER A STRETCHING SHEET WITH VARIABLE WALL THICKNESS: USING CATTANEO-CHRISTOV HEAT FLUX MODEL by R.V.M.S.S.Kiran Kumar and S.V.K.Varma Department of Mathematics, Sri Venkateswara University, Tirupati 517502, A.P., India
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The hydrodynamic nanofluid flow over a stretching sheet in a porous medium with variable wall thickness in the presence of Brownian motion and thermophoresis is investigated. The heat transfer characteristics with variable conductivity are explored by using Cattaneo-Christov heat flux model. The governing non-linear

ordinary differential equations are solved by using boundary valued problem defaults solved in MATLAB bvp4c package. The impact of various important flow parameters on velocity, temperature and nanoparticle concentration as well as the friction factor coefficient and the rate of heat and mass transfer coefficients are presented and discuss through graphs and tables. It is found that the fluid velocity is accelerated with an increase in wall thickness parameter for $n > 1$, while the reverse trend is observed for $n < 1$.

17.UNSTEADY MHD MIXED CONVECTION FLOW OF JEFFREY FLUID PAST A RADIATING INCLINED PERMEABLE MOVING PLATE IN THE PRESENCE OF THERMOPHORESIS HEAT GENERATION AND CHEMICAL REACTION by K. Venkateswara Raju, A. Parandhama, M.C.Raju and K. Ramesh Babu Department of GEBH(Mathematics), Sree Vidyanikethan Engineering College(Autonomous), A.Rangampet, Tirupati 517102 Department of H&S, Annamacharya Institute of Science and Technology(Autonomous), Rajampet - 516126, YSR Kadapa (Dst.), A.P., India
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In this manuscript we studied the unsteady magnetohydrodynamics mixed convection Jeffery fluid flow over an inclined permeable moving plate in presence of thermal radiation, heat generation, thermpohoresis effect and homogeneous chemical reaction, subjected to variable suction is considered. The governing equations are solved by using regular perturbation technique. The expressions for the distributions of velocity, temperature and species concentration are obtained. With the aid of these, the expressions for Skin friction, Nusselt number and Sherwood number also derived. The influences of various physical parameters involved in the problem on the maintained quantities are discussed with the help of graphs and tables. From the significant findings, it is found that the velocity increases with an increase in Soret number in the presence of permeability. It shows reverse effects in the case of heat absorption coefficient, magnetic parameter, radiation parameter and chemical reaction parameter.

18.RADIATING AND REACTING MHD NEWTONIAN FLUID PAST A POROUS PLATE by P. Rama Krishna Reddy, M.C.Raju and S.V. K.Varma Department of Mathematics, Shri Venkateshwara University, Venkateshwara Nagar, Rajabpur, Gajraula, Uttar Pradesh 244236, India.
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This manuscript is focused on unsteady magnetohydrodynamic(MHD) free convective flow of a double diffusive fluid past a moving vertical porous plate in the presence of thermal radiation and first order homogenous chemical reaction. The temperature of the plate is assumed spanwise consinusoidally fluctuating with the time in the presence of heat generation. The second order perturbation technique is employed to investigate the nonlinear partial differential equations governing the fluid flow which are non dimensionalized by introducing the similarity transformations. The effects of magnetic intensity, radiation, porous permeability, Eckert number, Schmidt number and heat generation/absorption parameters on velocity, concentration and temperature. Also, the skin friction coefficients, the rate of heat transfer and rate of mass transfer at the surface of the plate are computed numerically. The results shows that within the boundary layer, the velocity and temperatures are found to decrease with the increasing values of Prandtl number and radiation parameters however the trend is reverse with respect to porous permeability and heat generation/ absorption parameters

19.UNSTEADY THREE-DIMENSIONAL MHD NANOFLUID FLOW

OVER A STRETCHING SHEET WITH VARIABLE WALL THICKNESS AND SLIP EFFECTS by G.Vinod Kumar, S.Venkateswarlu, S.Geethan Kumar and S.V.K. Varama Department of Mathematics, S.V. University, Tirupati-517502, A.P., India.
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The stretching sheets with variable thickness may occur in the enginerring applications more frequently than a flat sheet. Due to its manifold application in the present analysis we considered a three dimensional unsteady MHD nanofluid flow over a stretching sheet with variable wall thickness in a porous medium. The effects of radiation, viscous dissipation and slip boundary conditions are taken into account. Buongiorno's model is incorporated to study the combined effects of thermophoresis and Brownian motion. The dimensionless governing equations are solved by using MATALAB bvp4c package. The impact of various important flow parameters are presented and analyzed through graphs and tables. It is interesting to note that all the three boundary layer thickness are depreciated by slips parameters. Further, the unsteady parameter declines the hydromagnetic boundary layer thickness.

20.STUDY OF FLOW CHARACTERISTICS OF NON-NEWTONIAN BLOOD IN BELL SHAPED STENOTIC ARTERY IN THE PRESENCE OF MAGNETIC FIELD by Madan Lal and Yantish Dev Jha Department of Applied Mathematics, M.J.P.Rohilkhand University, Bareilly 243006, India
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The flow of blood through a stenosed artery under the influence of external applied magnetic field is studied. The artery is considered as a circular tube. The nature of blood is considered as non-Newtonian. The effect magnetic field, height of stenosis, parameter determined the shape of the stenosis on velocity field, volumetric flow rate in stenotic region and wall shear stress at surface of stenosis have been analyzed analytically and shown graphically. Some important observations regarding the flow of blood in stenosed artery are obtained leading to medical interest.

21.MHD NATURAL CONVECTION HEAT GENERATING/ ABSORBING AND RADIATING FLUID PAST A POROUS PLATE IN THE PRESENCE OF THERMAL DIFFUSION by P.Chandra Reddy M.C. Raju and G.S.S. Raju Department of H&S, Annamacharya Institute of Science and Technology(Autonomous), Rajampet - 516126, YSR Kadapa (Dst.), A.P., India.Department of Mathematics, JNTUA Colege of Enginerring, Pulivendula, A.P., India.
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The aim of the present work is to analyze the characteristic of MHD free convective radiating fluid past a porus plate in the presence of thermal diffusion and heat source/sink along with variable temperature and concentration. An exact solution has been employed by usual Laplace transform technique. The effects of diverse parameters on velocity, temperature and concentration are discussed through graphical representations. Also the variations in shear stress, rate of heat transfer and rate of mass transfer under the influence of some parameters are discoursed with the help of tables. In the presence of heat source the fluid velocity and temperature increases whereas the concentration decreases. The velocity and temperature falls down in the presence of heat sink but a reverse trend is found in the case of species concentration. Increasing values of Soret number serves to enhance the velocity and species concentration but opposite nature is seen in the case of Schmidt number. Sherwood number enhances with the rising values of Schmidt number and decreasing values of Soret number. The current study is well supported by the verification of previously published result.

22.EFFECT OF PERISTALSIS AND CILIA ON THE FLOW RATE OF MICROPOLAR FLUID IN AN INCLINED CHANNEL UNDER THE INFLUENCE OF MAGNETIC FIELD AND POROUS MEDIUM
by D Saroj Vernekar, S V H N Krishna Kumari and Y.V.K. Ravi Kumar Department of Mathematics, Stanley College of Engineering and Technology for Women, Hyderbad-500001, India. Department of Mathematics, K.L. University, Hyderabad-522502, India.Practice School Division, Birla Institute of Technology & Science-Palani, Hyderabd-500078, India.
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The steady of the influence of magnetic field, channel inclination, porous medium on the Micropolar fluid with and with out slip conditions under the effects of Peristalsis , Cilia are discussed independently. The method of solving Navier Stokes equation specific to Micropolar fluids under the joint influence of these effects are presented. The profiles of velocity (along the flow direction), the micro rotation vector and the variation of pressure rise with time average flow rate for fixed value of other parameters were carried out and the results are discussed through the graphs.

23.THE EFFECTS OF THERMOCAPILLARITY ON THE THIN FILM FLOW OF MHD UCM FLUID OVER AN UNSTEADY ELASTIC SURFACE WITH CONVECTIVE BOUNDARY CONDITIONS by K.V. Prasad and Hanumesh Vaidya Department of Mathematics, VSK University, Vinayaka Nagar, Bellary-583 105, Karnataka, India Department of Mathematics, SSA Government First Grade College (Autonomous),Ballari-583 101, Karnataka, India
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In this paper, the effects of thermocapillarity on flow and heat transfer in a liquid film of MHD Upper Convective Maxwell fluid over an unsteady elastic stretching sheet subject to velocity slip and convective boundary condition are analyzed. Similarity transformations are used to transform the governing equations to a set of coupled nonlinear ordinary differential equations. The differential equations are solved numerically via second-order finite difference scheme known as the Keller-Box method. Results of the velocity and the temperature distributions are presented graphically for different values of the pertinent parameters. The effects of the unsteady parameter on the skin friction, the wall temperature gradient and the film thickness are presented and analyzed. The thermocapillarity parameter has the decreasing effect on the temperature field and the local skin-friction coefficient.

24.EFFECT OF PERIPHERAL LAYER ON PERISTALTIC TRANSPORT OF A COUPLE-STRESS FLUID WITH NANOPARTICLES by K. Maruthi Prasad and N. Subadra Department of Mathematics, School of Technology, GITAM University, Hyderabad Campus, Hyderabad, Telangana, India 502329. Department of Mathematics, Geethanjali College of Engineering and Technology, Cheeryal(Vi), Keesara (M), Medchal(Dt), Telangana, India 501301
Peristaltic transport of couple-stress fluid with nano particles in the core region and Newtonian fluid in the peripheral region is studied under the assumption of long wave length and low Reynolds number. The equations governing the flow are solved and closed form expressions for velocity in the peripheral region as well as in the core region, pressure drop, time averaged flux, frictional force, mechanical efficiency, heat transfer coefficient and mass transfer coefficients have been obtained. The effects of various parameters like couple-stress fluid parameters $\bar{\alpha}, \bar{\eta}$ viscosity ratio, mean radius of the central layer, local temperature Grashof number, local nanoparticles Grashof number, Brownian motion parameter and thermophoresis parameter on these flow variables have been studied. Stremline patterns and trapping phenomena have been studied and sketched through graphs at the end

25.RADIATION AND MHD EFFECTS ON AN OSCILLATORY FLOW OF A JEFFREY FLUID IN A CIRCULAR TUBE by B. Swaroopa and K. Ramakrishna Prasad Department of Mathematics, Govt. Degree College (W), Srikalahasti, Chottoor(Dist.)Department of Mathematics, S.V.U. College of Sciences, S.V.University, Tirupati

The effect of heat transfer on unsteady MHD oscillatory flow of fluid in a tube is encountered in a wide range of engineering and industrial applications such as molten iron flow, recovery extraction of crude oil, geothermal systems. Many chemical engineering process like metallurgical and polymer extrusion process involve cooling of a molten liquid being stretched in a cooling system. Some polymers fluids like polyethylene oxide and plysobutylene solutions in a cetane, having better electromagnetic properties are normally used as cooling liquid as their flow can be regulated by external magnetic fields in order to improve the quality of the final product. Also, the radiative heat transfers is an important factor of thermodynamics of very high temperature systems such as electric furnaces, solar collectors, storage of nuclear wastes packed bed catalytic reactors, satellites, steel rolling, cryogenic engineering etc. The study of such flow under the influence of magnetic field and heat transfer has attracted the interest of many investigators and researchers. In view of these, we studied the effects of heat transfer and MHD on oscillatory flow of Jeffrey fluid in a circular tube with radiation. The expressions for the velocity field and temperature field are obtained analytically. The effects of various emerging parameters on the velocity field and temperature field studied in detail with the help of graphs.

26.RADIATION AND MASS TRANSFER EFFECTS ON MHD BOUNDARY LAYER FLOW DUE TO AN EXPONENTIALLY STRETCHING SHEET WITH HEAT SOURCE by R.L.V. Renuka Devi, A.Neeraja and N.Bhaskar Reddy Department of Mathematic S. V . University, Tirupati. Department of Mathematics, Aditya College of Engineering, Surampalem, E.G (Dist)

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This paper focuses on the study of the heat and mass transfer effects on MHD boundary layer flow of a viscous incompressible and radiating fluid over an exponentially stretching sheet. The initial governing boundary layer equations are transformed to a system of ordinary differential equations, which are then solved numerically by a fourth order Runge-Kutta method along with shooting technique. A parametric study is conducted and so that Numerical result are obtained for the velocity, temperature and concentration as well as the skin-friction coefficient, the local Nusselt number and local Sherwood number for different values of the material parameters, namely, the magnetic parameter, heat source parameter, radiation parameter, Schmidt number and Prandtl number and discussed in detail.

27.MHD STAGNATION POINT FLOW OF A JEFFREY FLUID OVER A STRETCHING/SHRINKING SHEET THROUGH POROUS MEDIUM by M. Eswara Rao and S. Sreenadh Department of Mathematic S. V . University, Tirupati.

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The MHD stagnation point flow of a Jeffrey fluid over a stretching/ shirinking sheet through porous medium is studied. Using similarity transformation, the governing boundary layer partial differential equations are converted into non-linear ordinary differential equations and solved it by using Runge-Kutta fourth order method along with shooting technique. The effects of governing parameters on velocity, temperature, concentration, heat transfer and mass transfer are displayed through graphs while rate of heat transfer is shows numerically

28.EFFECTS OF HALL CURRENTS ON RADIATIVE CASSON FLUID FLOW INDUCED BY AN EXPONENTIALLY STRETCHING SURFACE WITH CONVECTIVE BOUNDARY CONDITION by V. Nagendramma Sri Padmavati Mahila Visvavidyalayam
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This exploration addresses MHD Casson fluid flow over an exponential stretching sheet in the presence of Hall currents and convective boundary condition with Boussinesq approximation. The effects of thermal radiation and chemical reaction are added in temperature and concentration fields respectively. Furthermore, appropriate transformations are introduced to obtain nonlinear differential equations from the system of partial differential equations and a numerical solution of system of coupled differential equations is obtained by means of the renowned Keller box method. Through graphical illustrations momentum, energy and concentration distributions are conversed for different prominent parameters. Comparison in limiting case is also part of present study to validate the obtained results.

29.POISEUILLE FLOW OF A JEFFREY FLUID IN AN INCLINED POROUS LAYER OF VARIABLE PERMEABILITY by B. Reddappa, S. Sreenadh Department of General Engineering and Basic Humanities, Sree Vidyanikethan Engineering College, Tirupati, A.P, INDIA.Department of Mathematics, S.V. University, Tirupati, A.P, INDIA
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The flow of a Jeffrey fluid in an inclined porous layer of variable permeability is investigated. It is assumed that the permeability is a quadratic, parabolic function of y. The flow in the porous medium is governed by Brinkmans equation with variable permeability. Expressions for the velocity distribution, the mass flow rate and skin friction are obtained. These expressions are evaluated for various values of the parameters. The numerical results obtained reveal many interesting behaviors. It is observed that the velocity increases with increasing Jeffrey parameter and the mass flow rate decreases with increasing dimensionless number H_a which is a function of maximum permeability of the porous layer.

30.IMPACT OF FRICTIONAL HEATING ON MHD RADIATIVE FERROFLUID PAST A CONVECTIVE SHRINKING SURFACE by K. Anantha Kumar, J.V. Ramana Reddy, B. Ramadevi, V. Sugunamma & N. Sandeep Department of Mathematics, S. V. University, Tirupati-517502, India. Department of Mathematics, VIT University, Vellore-632014, India.
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The intention of this analysis is to analyse the heat transfer impact on MHD ferrofluid flow over a shrinking sheet. This study is carried out under the knowledge of frictional heating, Biot number and thermal radiation. With the assist of suitable similarity transformations, the governing equations are transmuted into coupled nonlinear ODEs and then numerically solved by R.K. Fehlberg Technique. For this study, we considered the water-Fe_3O_4 ferrofluid. The behavior of sundry physical parameters on fluid velocity, temperature, skin friction coefficient and local Nusselt number are discussed and presented through plots and tables. Through this investigation, we found that the magnitude of fluid velocity enhances with rising values of volume fraction of nanoparticles. Also, it is found that the Eckert number has tendency to reduce the rate of heat transport.

31.RADIATION EFFECT ON UNSTEADY MHD OSCILLATORY FLOW OF A CHEMICALLY REACTING FLUID PAST A VERTICAL CHANNEL SATURATED WITH POROUS MEDIUM by L. Padmavathi, S. Venkateswarlu and M. Suryanaryana Reddy Department of Mathematics , RGM college of Engg

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In this manuscript, we have investigated analytically the influence of radiation and suction/injection on unsteady MHD oscillatory flow past a vertical with in constant wall temperature and concentration. The fluid is subjected to a transverse magnetic field and the velocity slip at the lower plate is taken into consideration. The non-dimensional governing equations are solved in closed form by using Perturbation technique. Exact solutions are obtained for velocity, concentration and temperature with the aid of these expressions Skin-friction, Sherwood number and Nusselt number are derived. Various physical parameter effects on the above flow equations are studied numerically with the help of graphs. It is interesting to note that skin friction increases on both plates as injection increases on the heated plate.

32.MASS TRANSFER EFFECTS ON MHD MIXED CONVECTIVE PERIODIC FLOW THROUGH POROUS MEDIUM IN AN INCLINED CHANNEL WITH TRANSPIRATION COOLING AND THERMAL RADIATION by Y.Swapna and S.V.K. Varma Department of Mathematics, Sri Venkateswara University, Tiruapti-517502, India.
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In this paper the effects of mass transfer on unsteady MHD mixed convective periodic flow of a viscous incompressible and electrically conducting fluid through porous medium in an inclined channel with horizontal. The lower stationary plate and the upper plate in unsteady periodic motion are subjected to a same constant injection and suction velocity respectively. The temperature of the upper plate in periodic motion varies periodically with time. The flow in the channel is also acted upon by periodic variation of pressure gradient. A closed form solution of the problem is obtained. The effects of various flow parameters on the velocity, temperature and concentration fields have been analyzed with the aid of graphs.

33.EFFECTS OF VISCOUS DISSIPATION AND JOULE HEATING ON MHD NONLINEAR RADIATIVE CASSON AND WILLIAMSON FERROFLUID FLOWS WITH TEMPERATURE DEPENDENT VISCOSITY by J.V. Ramana Reddy, V. Sugunamma and N. Sandeep Department of Mathematics, Sri Venkateswara University, Tiruapti-517502, India.Department of Mathematics, VIT University, Vellore-632014, India.
The integrating impacts of Joule dissipation and frictional heating on non-Newtonian ferrofluid flows past a bidirectional stretching convective surface are investigated. We assume that Fe_3O_4 nanoparticles are mixed with methanol. Both Casson and Williamson model are opted while formulating the basic flow equation. The impact of temperature dependent viscosity is accounted. The Joule heating and viscous dissipation impacts are accounted while setting the equation of energy. Shooting and R.K. numerical procedures are summoned to decipher the flow problem. Graphical and tabular illustrations are incorporated with a view of understanding the nature of flow and heat transfer for discrete values of flow parameters. It is worth to note that the thickness of velocity boundary layer of Casson fluid flow is greater than that at Williamson fluid flow. Also the presence of Joule and frictional heating supplies more heat energy to Casson fluid flow while compared to that of Williamson fluid. Heat transfer rate is better in Willamson fluid compared to that of Casson fluid

34.HYDROMAGNETIC COUETTE FLOW OF AN IONIZED GAS BETWEEN PARALLEL POROUS WALLS THROUGH A POROUS MEDIUM by B. Rama Devi, S. Sreenadh and V. Ramesh Babu Department of Mathematics ,

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Hydromagnetic Couette flow of an in ionized gas between two parallel porous walls through a porous medium has been analyzed in the presence of a uniform magnetic filed applied transversely to the flow. Exact solution has been obtained as solving the governing equations of motion accounting for the primary and secondary velocity distributions. The effects of the various parameters on primary and secondary velocity distributions are presented graphically in both partially and fully ionized cases. It is observed that the primary velocity and secondary velocity in both partially and fully ionized cases increase with an increase in Hall parameter m, Darcy number Da and Couette number c_0. It is also obeseved that the primary and secondary velocities decrease with Hartmann number M and suction Reynolds number λ.

35.ENTROPY GENERATION ON MHD JEFFREY FLOW IN AN INCLINED CHANNEL WITH DEFORMABLE POROUS MEDIUM by G. Gopi Krishna, S. V. Sailaja Kumari, V Manoj Kumar Uppuluri, S. Sreenadh and Y.V. K. Ravi Kumar Department of Mathematics, Sri Venkateswara University, Tirupati 517502, A.P. Department of Mathematics, VFSTRUniversity, Vadlamudi, Guntur-522513, A.P.Practice School Division, Birla Institute of Technology & Science-Pilani, Hyderabad, India

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The flow of a MHD Jeffrey flow in an inclined channel with deformable porous medium bounded by rigid plates is investigated. The lower and upper moving plates are maintained at different constant temperatures. The coupled phenomenon of the fluid movement and solid deformation in the porous medium is considered. An exact solution of governing equations has been obtained in closed form. The expressions for the fluid velocity, solid displacement and temperature distribution are obtained. The influence of pertinent parameters on the fluid velocity, solid displacement, temperature profiles, entropy generation number and Bejan number are discussed in detail. In the inclined deformable porous medium, it is observed that the fluid velocity and temperature distribution decreases with increasing viscous drag δ. But the solid displacement increases with increasing viscous drag δ. One of the important observations is the volume flow rate is less for deformable porous media as compared to porous media in a channel. The present result coincides with the findings of Nield et al. [29] for rigid porous media case. Further, entropy generation number increases with increasing volume fraction. The results obtained for the present flow characteristics reveal many interesting behaviours that warrant further study of viscous fluid in an inclined deformable porous media.

36.THIN FILM FLOW OF A MICROPOLAR FLUID OVER AN INCLINED MOVING PERMEABLE BELT by E.Sudhakara, S.Sreenadh and V. Viswa Mohan Department of Mathematics, Siddharth Institute of Engineering & Technology, Puttur- 517583 (A.P.), INDIA Department of Mathematics, Sri Venkateswara University, Tirupati-517502 (A.P.), INDIA Department of Mathematics, RSR Engineering College, Kavali-524 201 (A.P.), INDIA

The flow and heat transfer of a micropolar fluid over an inclined moving permeable belt is investigated. The flow in the thin film region is governed by micropolar fluid model whereas the flow in the permeable belt is described by Darcy law. The expressions for the fluid velocity and the microrotation are obtained. When the Darcy number tends to zero, the results reduce to the corresponding ones of Sajid

et al. (2009) for the thin film flow of a micropolar fluid over an inclined rigid plane. The effects of permeability and micropolar parameters on the fluid velocity and microrotation are discussed. It is observed that the magnitude of microrotation and the fluid velocity decreases with increasing micropolar parameter K.

37.STEADY FLOW OF JEFFREY FLUID DOWN AN OPEN INCLINED CHANNEL WITH NATURALLY PERMEABLE BED by K. Sushma, S. Sreenadh, P. Dhanalakshmi and P.V. Arunachalam Department of Mathematics, S.V. University, Tirupati 517 502, A.P., India Department of Mathematics, Former Vice- Chancellor Dravidian University, Kuppam

Steady laminar flow of Jeffrey fluid down an open inclined channel is analyzed. The channel is bounded below by saturated naturally permeable bed. The flow above and through the infinite permeable bed are governed by Jeffrey model and Darcys law respectively. The velocity in the free flow region is found using the Fourier Transform technique. The volume flux is obtained and the results are discussed for various parameters of practical interest. It is observed that the velocity increases with the increase in the permeability and Jeffrey parameter. Also we observe that the flux for the channel with permeable bottom is greater when compared with the corresponding flow with impermeable bottom.

38.VARIATIONS IN A TRANSVERSELY ISOTROPIC THERMOELASTIC WITH TWO TEMPERATURE WITHOUT ENERGY DISSIPATION DUE TO TIME HARMONIC SOURCES by Parveen Lata Depatment of Basic and Applied Science, Punjabi University Patiala

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The present work is aimed at the thermoelstic interaction in a two dimensional homogeneous, transversely isotropic thermoelastic solids with two temperature in the contaxt of Green-Naghdi model of type-II due to time harmonic sources. The Hankel transform has been employed to find the general solution to the field equations. Concentrated normal force, normal force over the circular region and concentrated thermal source and thermal source over the circular region have been taken to illustrated the application of the approach. The components of displacements, stresses and conductive temperature distribution are obtained in the transformed domain. The resulting quantities are obtained in the physical domain by using numerical inversion technique. Numerically stimulated results are depicted graphically. A comparison is made by showing the effect of two temperature, one temperature and anisotropy on the components of normal displacement, normal stress, tangential stress and conductive temperature.

39.PERISTALTIC FLOW OF A CONDUCTING WILLIAMSON FLUID IN A TAPERED ASYMMETRIC POROUS MEDIUM CHANNEL by K.V.V Satyanarayana, S.Sreenadh, V.Ramesh Babu and R.Saravana Department of Mathematics, Sri Venkateswara University, Tirupati 517502, A.P. Department of Mathematics, Rashtriya Sanskrit Vidyapeetha, Tirupati, A.P. Department of Mathematics, MITS, Madanapalli, A.P.

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In this paper, MHD peristaltic transport of a Williamson fluid through a tapered asymmetric channel filled with porous material is investigated. The flow is analyzed in the wave of reference moving with the velocity of the wave. A regular perturbation technique in terms of small Weissenberg number has been carried out to determine the expressions for the velocity and the pressure gradient. The effects of Weissenberg number, Hartmann number and Darcy number on the pressure rise and frictional force per wavelength are discussed and the results are shown graphically. It is observed that, the time-averaged volume flow rate $\bar{Q}$ decreases with

increasing Weissenberg number We.

SECTION M: BIO-MATHEMATICS

1.PREY PREDATOR DYNAMICS WITH A STRONG PREY ,WEAK PREDATOR AND HARVESTING OF PREY by Paparao. A.V and Laksmi Narayan. K Department of Mathematics, JNTUK, UCE Vizianagaram-535003, India Department of Mathematics, VITS, Deshmukhi Hyderabad-508284, India
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In this paper we investigate the harvesting effort of prey species in prey predator model with a strong Prey (N_1) and weak Predators (N_2). The system is described by a system of ordinary differential equations. The Four equilibrium points are identified. Local stability analysis is discussed at each of its equilibrium points. Global stability is studied by constructing suitable Lyapunov's function . Further Numerical simulation is performed and identified the parameters for the system which becomes stable and unstable. Further the results are compared with harvesting effort and without effort on the prey species. The Harvesting efforts of the pery species with catch ability coefficient and effort are identified for which unstable system becomes stable thus the harvesting effort stabilizes the system.

2.A TWO SPECIES AMENSALISM MODEL WITH CONSTANT HARVESTING ON BOTH SPECIES by Dr. Sita Rambabu. B and Dr. Lakshmi Narayan K Department of Mathematics, VJIT, Hyderabad-500085, India. Department of Mathematics, VITS, Hyderabad - 508284, India,
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In this paper a two species Amensalism model is taken up for analytical study. In this model a constant number of first and second species are harvested. Moreover both the species are provided with limited resources. The series solution of the non-linear system was approximated by the Homotopy analysis method (HAM) and the results are supported by numerical simulations.

3.DYNAMICS OF A THREE SPECIES AMMENSALISM MODEL WITH HARVESTING by Kondala Rao. K and Dr. Lakshmi Narayana. K Assistant Professor, Vidya Jyothi Institute of Technology, Hyderabad, India. Professor of Mathematics, Vignan Institute of Technology and science, Hyderabad, India.
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The present model is devoted to an analytical investigation of a three species synecological model in which the species of first kind (N_1) is ammensal on the species of second kind (N_2), the species of second kind (N_2)is on the species of third kind (N_3)and the species of third kind (N_3)is on the species of first kind (N_1) here specifies of first kind (N_1) and species of second kind (N_2) are harvested at a rate proportional to their population sizes. Co-existing state is identified and its local stability is discussed. Solution of linearized equation are carried out. Further, with the help of suitable Lyapunov function global stability was discussed. In support of analytical results, numerical simulations were carried out using Mat Lab.

4.HARMONIC REDUCTION IN WIND TURBINE ENERGY CONVERSION SYSTEMS by J.N. Chandra Sekhar, A.Sreenivasulu G.Panduranga Reddy and L.Mohan Krishna Department of EEE, S.V. University College of Engineering, Tirupati, India. Department of EEE, GPCET, Kurnool, India. Department of EEE, MNIT, Allahabad, India.
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Permanent magnet synchronous generators (PMSG) wind energy conversion system (WECS) using variable speed operation is being used more frequently in low power wind turbine application. Variable speed systems have several advantages over the

traditional method of operating wide turbines, such as the reduction of mechanical stress and increase in energy capture. To fully exploit the last mentioned advantage, many efforts have been made to develop maximum power point tracking (MPPT) control schemes for PMSG WECS. To allow the variable speed operation of the PMSG WECS a conventional three phase bridge rectifier with a bulky capacitor associated with voltage source current controlled inverter (VSCCI) is used. This simple scheme introduces a high intensity low frequency current harmonic content into the PMSG and consequently increases the total loses in it. Subsequently , decreases the power capability of the system. This paper presents a comparative simulation study between three different approaches applied to harmonic mitigation on PMSG WECS. The studied techniques are : a) harmonic trap filters, b) single-switch three-phase boost rectifier and c) three-phase boost type PWM rectifier.

SECTION N: HISTORY AND TEACHING OF MATHEMATICS

1.DEVELOPMENT OF CALCULAS IN INDIA by Biswajit Ghosh
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This paper Development of Calculus in India present overview of the development of calculus in Indian mathematical tradition. Inventions in the classical period leads to the further work of kerala school starting with Madhava which has more direct bearing on calculus. The Ganita-Yukti-Bhasa of Jyesthadeva indeed present an overview of the work of kerala school of Mathematics during the period $c : 1350 - 1500$. Their treatment in Yuktibhasa, displays a clear understanding of the new infinitesimal method of Madhava. In deed, once dressed up in symbols and today‘s style of presentation, the Yuktibhasa proofs are essentially the same as can be found in a textbook of elementary calculus, it includes the actual working out of the (definite) integral. I will argue that the notion that captures the essence of calculus in both the Indian and the European approaches is the most and intuitively expressed geometrically: the local linearization of a curve and its relationship to determining its length (rectification), in other word the fundamental theorem of calculus in its most elementary geometrical version.

This News letter is Published by Prof. N. K. Thakare, General Secretary, Indian Mathematical Society at Pune (Maharashtra).

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